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VOL. XXII. NO. 9

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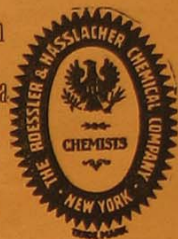
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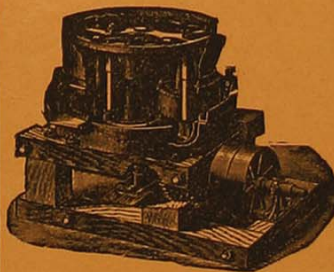
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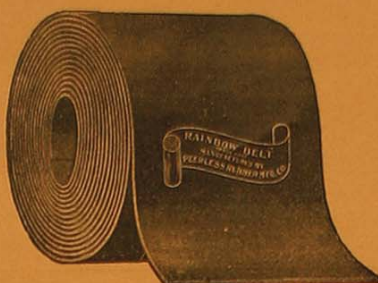
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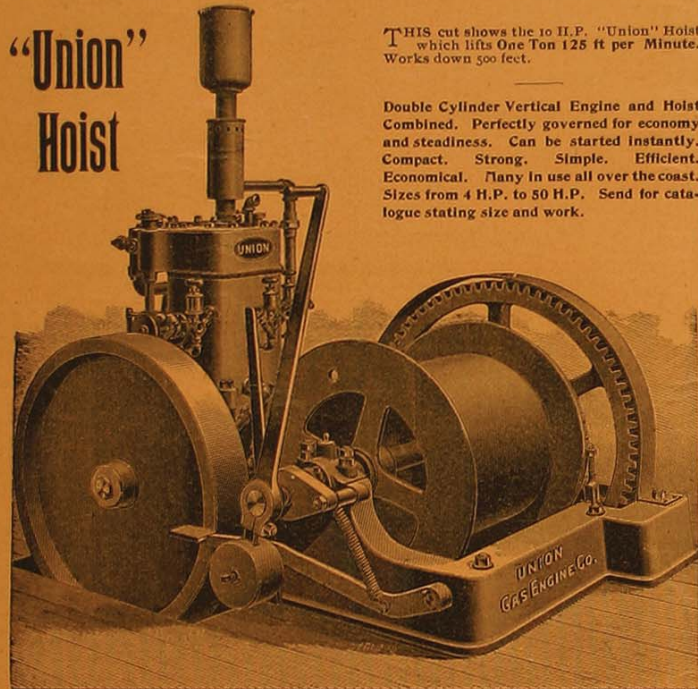
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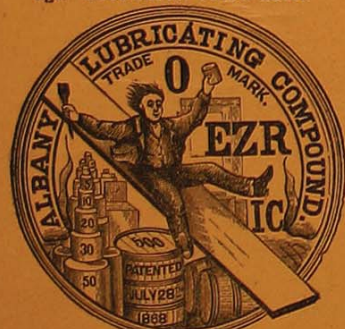
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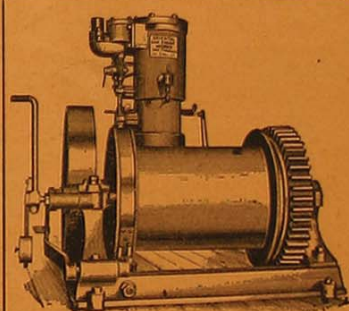
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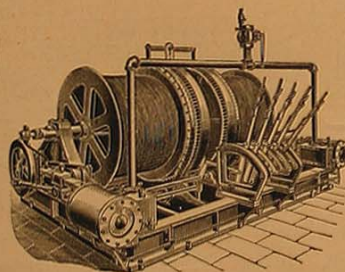
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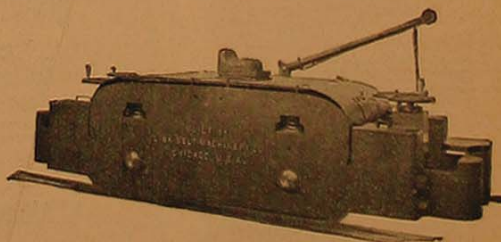
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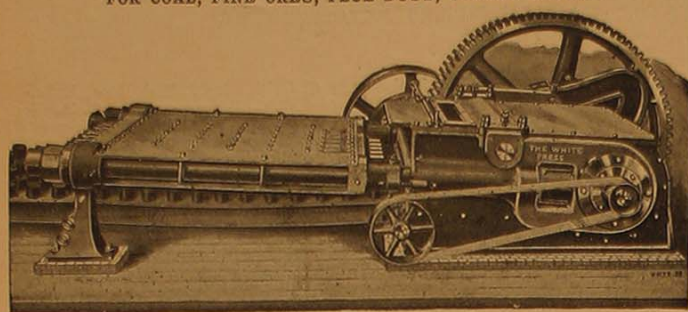
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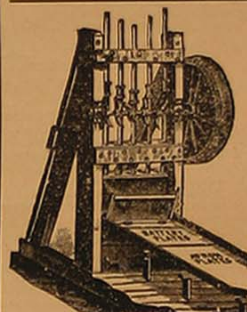
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eral years to exhaust it at that rate. This coinage of the silver bullion will not, however, increase the volume of money, as it is provided that the treasury notes shall be retired and canceled as fast as silver is coined.

The system thus quoted is peculiar and enigmatical. The new measure declares that the gold dollar composed of 25.8 grains ninety per cent fine, shall be the unit of value; that is to say that all else shall be measured by it, and that the parity of the two metals shall be maintained, or in other words, that the market price and debt-paying price shall be made equal. The theory of the advocates of the gold standard is that the value of silver shall be determined by its market price as a commodity instead of the denominational value stamped upon it at the mint. Silver then, as a matter of sentiment will be debarred.

The price of gold does not fluctuate in the markets because it has a fixed coinage value. It is that, and that only, which gives it steadiness. Silver would have the same steadiness of price in the markets were it treated as gold is at the mints. Coinage and commodity values would be the same in regard to both metals were the coinage laws applicable to both.

Discarded as silver is in the theory of the friends of the single gold standard, and notwithstanding their efforts to disparage it as a money, still they have not dared to wholly ignore it. Indeed, they are forced by the necessity which confronts them to give silver a large recognition, or it may be more accurate to say a large toleration. Necessity forces its use in fractional coins, and as business grows out of proportion to the increase of gold the necessity for a large use of silver will become more and more pressing.

A money system must be founded on common sense—the first feature is to assure amplitude of the money volume. It is not common sense to worship one material as a fetish. Whatever material is necessary to supply the needs of commerce must be employed. It should not be forgotten that money is a tool of commerce, and that law only defines it.

MINING INTERESTS OF SOUTH AFRICA.

Much of the recent development of Africa, especially in the southern part, where the greatest rapidity of development has occurred, is due to the discovery and exploitation of extremely valuable mineral deposits. The most valuable of these are gold and diamonds, though incidentally it may be mentioned that the iron, coal, and other mineral deposits of South and South-east Africa give promise of great value, when wealth-seeking man has time to turn his attention from the gold mines to those which promise less but perhaps equally certain profits.

That the gold and diamond mines of South Africa have been, and still are, wonderfully profitable is beyond question. The Kimberly diamond mines, which are located in British territory, just outside the boundaries of the Orange Free State and about 600 miles from Cape Town, now supply 98 per cent of the diamonds of commerce, although their existence was unknown previous to 1867, and the mines have thus been in operation but about thirty years. It is estimated that \$350,000,000 worth of rough diamonds, worth double that sum after cutting, have been produced from the Kimberly Mines since their opening in 1868-69, and this enormous production would have been greatly increased but for the fact that the owners of the various mines in this vicinity formed an agreement by which the annual output was so limited as to

meet but not materially exceed the annual consumption of the world's diamond markets. So plentiful is the supply, and so comparatively inexpensive the work of production that diamond digging in other parts of the world has almost ceased since the South African mines entered the field, and the result is, as stated above, that they now supply 98 per cent of the diamonds of commerce.

Equally wonderful and promising are the great "Witwatersrand" gold fields of South Africa, located in the South African Republic, better known as the "Johannesburg" Mines. The Dutch word, Witwatersrand, means literally "White Water Range," and the strip of territory, a few hundred miles long and a few miles in width, to which it is applied, was but a few years ago considered a nearly worthless ridge, useful only for the pasturage of cattle and sheep, and for even this comparatively valueless. In 1883, however, gold was discovered, and in 1884, the gold production was about \$50,000. It increased with startling rapidity, the production of 1888 being about \$5,000,000; that of 1890, \$10,000,000; 1893, over \$20,000,000; 1895, over \$40,000,000; and 1897 and 1898, about \$55,000,000. Other estimates have been placed higher. This wonderful development has attracted great attention to South Africa, and drawn thither thousands of people in the hope of realizing quick fortunes. Development, however, showed that the mines could only be successfully worked by the use of costly machinery, and while they have been extremely productive where machinery has been used, they are not of such a character as to make hand or placer mining profitable, as was the case in California.

The gold production in the "Rand," since 1884, has been over \$300,000,000; and careful surveys of the field, by the use of drills and other processes of experts, show beyond question that "the gold in sight" probably amounts to \$3,500,000,000, while the large territory, particularly in parts of Rhodesia, give promise of additional supplies, so that it seems probable that South Africa will for many years continue to be, as it now is, the largest gold-producing section in the world. Recent discoveries lead to the belief that these wonderfully rich mines are the long-lost "gold of Ophir," from which Solomon obtained his supplies, making a navy of ships in Ezion geber, which is opposite Elath, on the shore of the Red Sea, in the land of Edom, and Hiram sent in the navy his servants, shipmen that had knowledge of the sea, with the servants of Solomon; and they came to Ophir and fetched from thence gold * * * and brought it to King Solomon."

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nucleus of a good sized city, and Milwaukeeans may well point with pride to this company. It is doing more for that city than probably any other manufactory. It is carrying the name Milwaukee to the farthest corners of the world, and is making it felt as a great motive power. Its engines are driving the principal elevated and surface roads of the world they are pumping the water for many of the principal cities, they are doing the work for mines which every year add millions to the wealth of the world; they are making flour to feed millions of people; their sawmill machinery is making lumber out of the great forests, and in a thousand ways they are doing much to add to the comforts and to place the necessities of life where they are within the reach of all.

The originator and inceptor of this marvelous institution, Edward P. Allis, was a native of Cazenovia, N. Y., at which place he was born, May 12, 1824. He was a graduate at Union College, Schenectady, N. Y. In 1846, he removed to Milwaukee, Wis., where he formed a partnership with William Allen, and conducted a leather store. Subsequently the firm built and operated a large tannery at Two Rivers, Wis., but the business not being entirely to his taste, Mr. Allis sold his interest in 1854. In 1860, with Mr. C. D. Nash and Mr. McGregor, Mr. Allis purchased the Reliance Works. A few months later he bought his partners' interests and became sole owner and assumed personal supervision, which he continued until his death.

The Reliance Works, when purchased by Mr. Allis, was merely a small shop where machinery was repaired and special work made to order, the annual business amounting in all to not over \$31,000. Within four years of that time, however, under the energetic management of the new owner, the annual business had been increased to \$100,000. After his death, which occurred April 1, 1889, the old Reliance Works was incorporated as the Edward P. Allis Company, the capital stock amounting to \$1,500,000, being owned entirely by the Allis family.

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KLONDIKE GOLD FIELDS.

(BY TAPPAN ADNEY.)

Klondike (it was then only Yukon) lay for 15 years known only to a small though constantly increasing band of hardy adventurers, who hoped one day to make a fortune, but who were contented if they made a "grub-stake" for the next year. Three to five hundred dollars represented a "grub-stake"; some made considerably more, but few made less. All the gold found was in surface diggings, and if there was any other the frost, which froze the ground to an unknown depth, made it impossible to learn. Thus as early as 1882 a party was camped over the richest part of El Dorado, in a place frosted with surface gold. This

gold that might cling thereto. This fine gold, in which there was also much worthless magnetic black sand and valuable platinum (which the miners either did not recognize, or consider worth saving), was turned into a bucket, along with a spoonful or more of quicksilver, and "jounced" up and down in the river. The miner wore hip rubber boots for that purpose. When all the gold had united with the quicksilver, and amalgam formed, the latter product was placed in a mining pan and carefully "panned" at the water's edge, until all the lighter dirt was washed out, when the mass was placed in a stout cotton-bag and the quicksilver squeezed out for further use. The lump was then placed in a pan over a fire, the heat of which expelled the re-

the head of the claim. The last half dozen boxes of the string are fitted with "riffles," some being crosswise, others lengthwise, into the spaces of which the gold falls. Formerly the fine gold worked clean out of this crude contrivance and was lost.

Forty-Mile was the only stream discovered in which the bed rock came close to the surface, all the others were covered, no one knew to what depth. With the long-handled, California shovel a miner can shovel twelve or thirteen feet. He can shovel once upon a high platform, and thence into the boxes; but it is not profitable to handle the dirt more than twice. So, as the diggings of Bonanza and El Dorado average twenty to thirty feet, it will readily be seen that the Klondike



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3. CLEANING RIFFLES

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surface gold was as fine as cornmeal, and was secured from the "bars," or low banks of the rivers by means of a "rocker"—a sort of box-like cradle, with a perforated metal top and a blanket set inside at an angle. A shovelful of dirt containing the gold was put into the metal top, water was poured in with a long-handled dipper and at the same time the rocker was put in motion by means of an upright handle nailed to the side of the box. The larger rocks were lifted out by hand, but the residue was carried through by the water, the fine gold clinging to the blanket. After thirty to fifty "rockers" the blanket was taken out, and the "riffles"—a frame with cross pieces which prevents the gold from running out too rapidly—washed down to remove any

maining quicksilver, leaving a lump of fine gold, which was placed in a buckskin sack. There were only about two months in mid-summer when mining could be done. The sun, rising to 80° in the shade, thawed the ground about a foot a day. But the system changed. In 1886, the first "coarse" gold in the Yukon was discovered on Forty-Mile, which resulted in an abandonment of fine gold diggings. The rocker is retained to this day, and is always used where there is a scarcity of water. In latter operations the finding of "coarse" gold made it possible to employ sluice-boxes. A sluice-box is twelve feet long by a foot wide and about thirty or forty boxes are set upon posts at a certain grade, over the ground to be worked, leading from a dam at

would probably have remained unknown were it not for an accidental circumstance.

Some young men—boys they were called—tried thawing the ground with fire, but they were laughed at. A miner is pre-eminently a man of intelligence and resource, yet strangely slow to grasp an entirely new idea.

Hutchinson was one of the first to try burning. He had been working a bar during the summer, and could not reach some rich ground because of the water in the river. So, when winter set in, he conceived the ingenious plan of digging through the ice over a wide space. He was careful not to dig quite through. As the ice froze deeper day by day over the space he was digging, he reached the gravel bottom, having thus constructed a coffer-dam of



ROCKING OUT GOLD.

ice around him. He placed a fire on the gravel, and took out some gold, but the heat of the fire melted his walls, and the water flooded him out. Next year, however, a miner by the name of "Kink" Miller thought it would be a good thing to "prospect" and fire a shallow claim he intended to work the following summer. After that, when it was seen what fire would do, a few others began to sink deeper holes. The next step, when bed rock had been reached, was to burn along the rock. This is termed "drifting" and only came into general use about three years before the Klondike was discovered. The dirt obtained was hoisted out by means of a crude log windlass, but as it froze again immediately upon reaching the air, it was laid aside until spring, when the sun thawed out the heap, or "dump." It was then shoveled into sluice-boxes. A result of the new discovery was the dividing of the diggings, according to their depth, into "summer diggings" and "winter diggings." Summer work is much

less expensive than winter work, and the diggings at Forty-Mile and elsewhere in American territory are mostly summer diggings. At Klondike there is a much larger proportion of winter diggings. The American mines do not yet show the concentrated richness of the Klondike and so perhaps may never startle the world with "show" pans; but the most careful observers (such as Mr. Sam Dunham — the United States Labor Statistician) believe that the mines in our own country will prove of more economic value to the country at large than the somewhat richer but more expensive mines of Klondike.

The hardships of the Yukon are in one sense over-estimated. The long, dark, cold nights of winter, when the mercury drops to nearly sixty below zero, are wearing in the extreme, and homesickness is the most serious malady. The chief hardships are mere discomforts, to which a person becomes accustomed. March is the pleasantest month. Then there are as many hours of sunlight as in the Northern United States. In June the sun dips a few hours behind the mountain, and it is broad daylight at midnight. Even the birds, which make the woods and hillsides resound with their songs, sleep during the heat of the day and hunt and sing at night. To avoid the glare, tents are frequently made of dark blue denim. The miners work double shifts on the claims. There are hardly more than seventy days when water does not freeze. There is no night in Dawson during midsummer, and until saloons were closed on Sunday there was no Sunday either.

Until the past summer the social life of the mining camp centered in the saloon, and this was particularly true in winter. The saloons of a mining camp have no counterpart in the East, and the Yukon saloons have none anywhere. They contain a bar where whiskey and cigars are sold at half a dollar each; but there is also a barrel of clear, pure drinking water at the end of the bar, or to one corner, with a dipper on a nail—welcome to all. There might be tables covered with old, much-worn newspapers, and under the same roof, generally separated by a partition, elaborate gambling layouts, and perhaps a theatre and dance-hall.

Los Angeles Exposition.

The Industrial, Mining and Citrus Exposition will be opened in Los Angeles February 19th, continuing to March 10th, inclusive,



A CARRIER DOG.

and will be held under the auspices of the Merchants' and Manufacturers' Association. The exposition will be divided into three parts: the industrial, containing the manufactured products; the mining exhibit, showing the different ores found in Southern California, Arizona and New Mexico; and the citrus exhibit, containing a very instructive and practical illustration of the orange industry, from planting trees to packing oranges. In connection with the latter exhibit, a thorough display will be made of the insect pest, loaned for that purpose by the County Horticultural Commissioners of Los Angeles.

It is also proposed to have a perfect representation of a mine with drift over six feet high, with ore cars and cages, showing shafts and drifts where people may become familiar with the actual operation of the mines.

The industrial exhibit will embrace not only the articles manufactured in Southern California, but many attractive and interesting displays of works of art pertaining to educational advantages of this section.

An extensive program of novel and unique entertainment has also been prepared.



WORKING A BENCH CLAIM WITH SLUICE BOXES



SLUICING OUT THE DUMPS ON BONANZA CREEK

THE BLACK MOUNTAIN COAL FIELD.

By F. H. HEALD.

This coal field is located in Kern county, about 36 miles north-east of Mojave and about 15 miles north-west of Randsburg, in the sandstone formation which forms the base

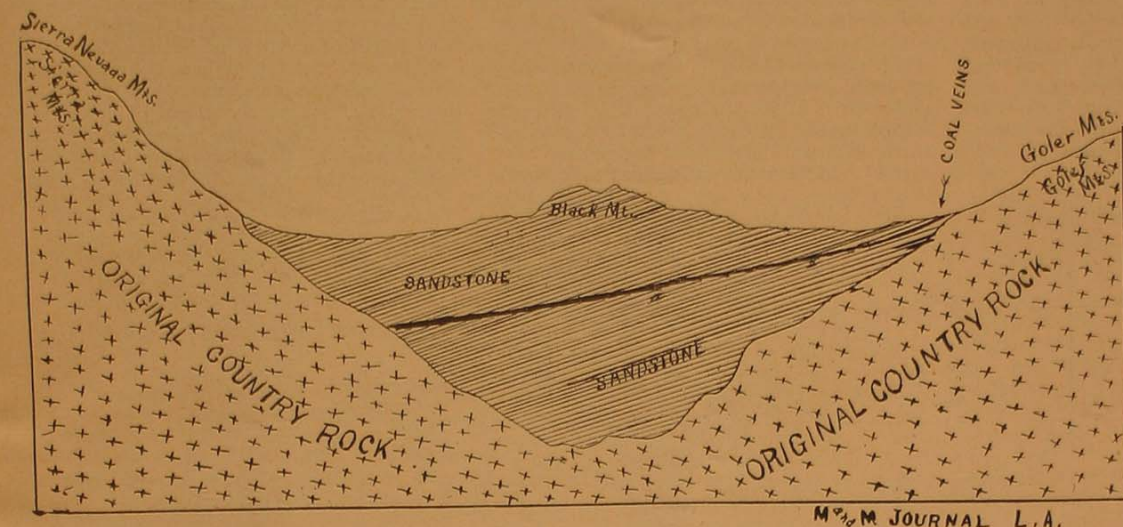
so easy to determine boundaries, especially of the coal on account of many evidences of it having been destroyed by volcanic action. Even the peak of Black mountain itself is the crater of an immense Volcano and is capped with more than 200 feet of loose and solid lava and down the sides for perhaps 1500 feet

was about two inches thick, showing clearly that it was coal and burning on a red hot stove. About 400 feet further on I sunk 16 feet and struck the coal seven inches thick, but of very poor quality and colored red by its near proximity to the surface and to the water coming from iron ledges in the Goler mountains. However, I drifted on this until it became a twelve vein, then I skipped two hundred feet and sunk again, this time reaching the first vein fifty feet. This vein is about four feet wide, but only from eleven to eighteen inches of solid coal, the balance being coal, dirt, etc., mixed. This should however turn to solid coal at a few hundred feet further into the mountain.

I have followed this vein about sixty feet and find more coal in the broken coal matter above the solid coal. Leaving this vein I sunk on down twenty feet more and reached a vein of forty-two inches of coal and coal matter.

About twenty-one inches strips, divided by three being pure coal, but in four strips of coal, dirt, etc., mixed. This second vein contains a better quality of coal than the vein above, and also contains more of the rings or disks, which I described and the JOURNAL kindly illustrated, in a former letter. August 15th, 1899.

I have not yet reached the third vein, but have reached the depth of 85 feet. The next vein will be the one I struck at 15 feet, described in the first shaft and should be according to the rule (the departure of the angles of the roof and floor,) forty-eight inches of



CROSS SECTION BLACK MOUNTAIN, GARLOCK, CAL.

of Black Mountain or El Paso Peak. This sandstone is recorded in the history of our California geology as the oldest sandstone in the state, which so far as I have seen certainly is. This sandstone has at some past age been formed in the bottom of a sea, of which the goler range of mountains was the south shore.

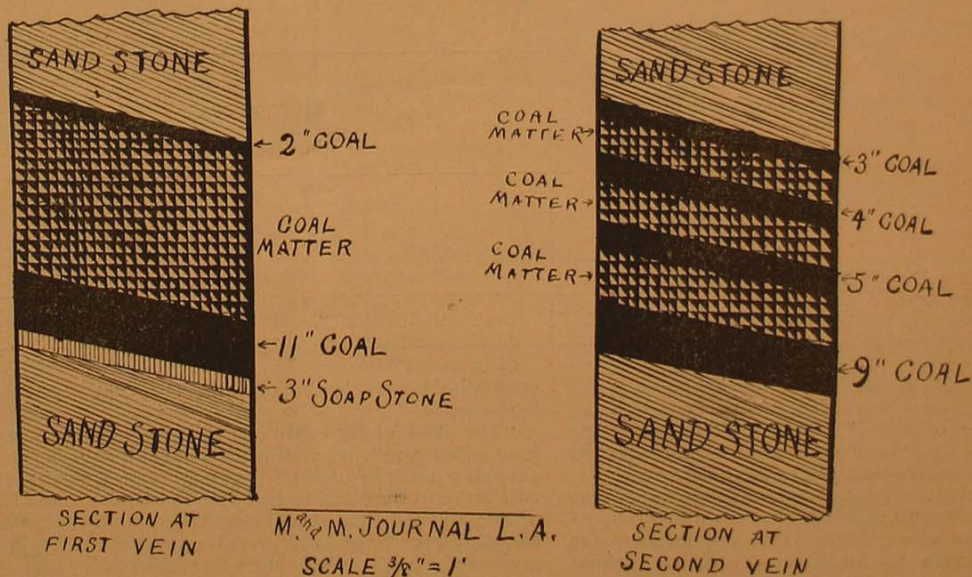
The coal was caused by immense beds of mud in the bottom of this sea almost at its first beginning and this mud may have been made in any of several different ways. It may have been made by beds of roots or Peet, by a vast Lake of reeds and bull rushes, or by immense washes of leaves, sticks, grasses and other vegetation, and afterwards covered by drifts of sandwash. The latter would appear to be the origin of the coal, judging from the fossil leaves plainly visible in the soapstone under, and the fire clay over each vein of coal.

This lake shore laying as it does against the north side of the Goler mountains exposes the coal, in places, where the great weight of the sandstone above it, has pinched or pressed it up on the old shore. In this way I have been enabled to discover the rim line of 1600 acres. The coal veins or layers underlie many thousands and acres back of this towards and beyond the Black mountain, but the down pitch of the sand stone (between which the coal lays) is so great, and the mountain rises so rapidly, that it is unlikely that the coal will ever be reached except through the land now taken, along the south rim or edge. The cut showing a cross section of the Goler mountains and the Black mountains will make the situation more plain.

Looking east, with the Goler mountains to the south and the Sierra Nevadas to the north; the ancient sea (now sand stone) containing Black mountain, would be about 20 miles in diameter, while east and west it is not

from the crater, the volcanic ash and mud is forced through, between the layers of sand stone horizontally, often displacing and tilting it in different directions. How far from the crater, the coal beds would be affected by the fire can only be a matter of conjecture, except, that there would undoubtedly be a vast body of natural coke between the good coal and that which is destroyed by heat.

In prospecting for the coal I have sunk shafts and drifted, aggregating perhaps 1500 feet, proving beyond a doubt in my own mind,

M. & M. JOURNAL L.A.
SCALE $\frac{3}{8}$ " = 1'

COAL VEIN IN HEALDS MINE AT GARLOCK, CAL.

or to any good western coal expert that there are three veins of coal underlying this basin.

Commencing at the south rim within a few feet of the country rock composing these mountains, at the last discovery I found a small streak of coal not more than $\frac{3}{8}$ of an inch in thickness. This I followed until it

solid coal and of an excellent variety. The coal has been used in considerable amounts at Garlock and Randsburg for domestic purposes and answers very well even at this short distance from the rim or its extreme limit. The second vein makes an excellent steam coal and both do remarkably well in a

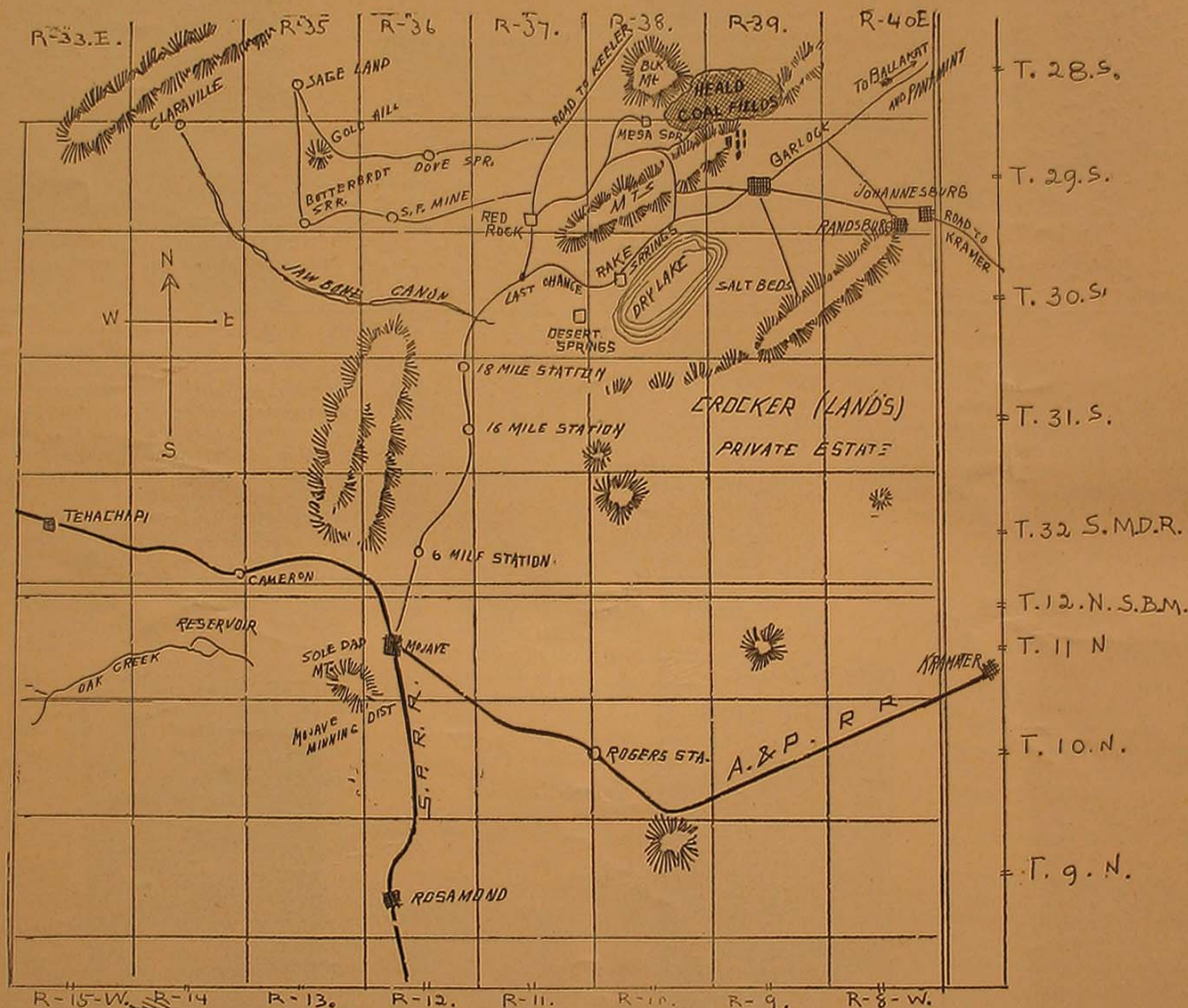
forge for sharpening or even welding tools. It is not, however, Blacksmith coal and for that business makes entirely too much blaze for comfort.

Enough has been done to prove the excellence of the coal and that farther in there must be large bodies of it. When the beds are opened properly the territory of their market will be half of the Pacific coast and half of the Pacific cape the great railroads reaching the coast, all the vast machinery which is and will be crushing our ores, and all the mighty smelters, which are soon to be planted in every direction through the mountains and deserts, for the coal can be made into coke.

shells are stuck together with carbonate of lime and mud. Coquina, too, may be coarse or fine, even when the shells are so small as to be almost indistinguishable. It is all carbonate of lime, either limestones built up by animals or the remains of their hard parts. The very coral reefs, such as are found in a few places, notably in Bermuda, Spitzbergen and in China, would indicate that either the animals that formed them were more hardy than those which at present build up the corals and which can only live between 25 degrees north and south latitude and the equator, or that the warmer waters extended much farther to the north, at least as far as to 80 degrees north latitude." The professor inclined to favor the

Lebanon and Lancaster and the Cumberland Valleys. Thus in our nearest neighborhood, and as a part of the City of Philadelphia, we have not only some of the youngest in these limestones. When compacted and crystallized these rocks form our native marbles, extending from this vicinity into Tennessee.

The solubility of limestone in water gives us other forms, which we call deuterogenous. The original limestone rocks are ontogenous. The alabastros of Egypt have been once dissolved limestone. Mexican onyx is not an onyx at all, but merely a form of deuterogenous deposit. Every one is familiar with the stalactites and stalagmites of the caves found in all limestone regions. These caves them-



A Study of Limestone.

"There is not enough lime in the ocean waters of to-day", said Prof. Heilprin some years ago, "to furnish the material we find so abundantly laid down in the limestone rocks, the organic limestones we see about us. From this we must conclude that other oceanic conditions once existed. The organic limestones are made up by the marine animals, whose hard parts or housebuilding survive in these great masses of rocks. The fresh water and land animals also play their part, such as mussels and snails. No difference can be distinguished between limestones which may have been separated in time of formation by millions of years. These remains are familiar to many of us in the coquina rocks of Florida and in the ordinary oyster shell reef, where the coarse

view that the ancient coral builders were a hardier race.

"The floor of the ocean is a whitish gray mud called ooze", he continued, "which may exist at a depth of 500 feet or 15,000 feet. It will make in time rocks, like the chalk pits of England and France, a globigerina ooze, so called from the globular creature, the globigerina, which makes in dying, these deposits."

"When limestone has been formed into crystals it becomes marble, such as the marbles a few miles from this city. The dull-looking limestone rocks, which do not glisten when they are broken are comparatively recent. They form the great valley which extends from Newburgh on the Hudson, away down to Georgia, known hereabouts as the White Marsh as Chester Valley; farther away the

selves have been washed out by the seas which formerly were on the frontier. The land waters percolating through the lime into the caves form the beautiful deuterogenous materials which we know under various names, and form a crust. It is from flowing water, lime-bearing streams, such as the Etruscan Spring of Carlsbad, in Bavaria, that these deposits are made. Into this water numerous objects are suspended to become incrustated and sold as bric-a-brac.

With the carbonate of lime in these rocks we have been discussing is sometimes associated the carbonate of magnesia, which forms the rocks known as the dolomites. The Swiss Alps are made up of gneisses, shales and schists, but the Alps of Dalmatia are dolomites. The peculiarities of these last rocks is

their jagged and peaked appearance. The dolomites give us the statuary marble and the beautiful pearlspar. Our near limestones, in the vicinity of Philadelphia, are the same that stretch up through New England and almost to the arctic circle, certainly to Newfoundland. They give no evidence of ever having been covered by the ocean. Some limestones in New York and New Jersey do contain fossils, but those in our neighborhood are searched in vain. All these are recent rocks, built up by organized bodies.

Limestone regions contain, as well as a scower, the depressions known as "sinks", where the rock has been hollowed out by the action of water. Florida is full of sinks. Old coral reefs are peculiar; later Bermuda perched up or what is probably an old volcano, built up on something, certainly. There is also in the heart of Russia a great buttress, from 1500 to 2000 feet high, and one in the heart of Austria. Old coral reefs form an ocean long extinct.

THE METALLURGY OF GOLD.

BY L. J. STABLER.

(Continued from our issue of Jan. 15th, 1900.)
THE CYANIDE PROCESS.

The practical value of this process has been verified by the erection and operation of some fifty mills, with a monthly capacity of 50,000 tons of tailings, concentrates and ore from which is extracted one-half million dollars of gold each month, which is added to the world's available gold reserve.

The leaching with weak cyanide solutions is applicable to free milling ores and to all refractory ores, containing only a small quantity of soluble acid compounds. Highly silicious and basic ores give high degrees of extraction with cyanide treatment, but to determine the adaptability of an acidic or pyritiferous ore to the treatment requires an experimental investigation, before an opinion can be given. Tailings, containing "floured quick" yield up their value to the potassium cyanide during treatment. The quicksilver amalgam, that is sometimes found in tailings, is mechanically collected while discharging the pulp from the vats. The gold and silver are recovered from amalgam by distillation.

The appliances for treating ores, tailings and concentrates are of great variety, both in size and design, the general principle in all of them being the same. The objects which they have to fulfill consist briefly in:

- (1) Lixivation of the ore tailings, or concentrates with weak solution of cyanide of potassium, for the purpose of dissolving gold.
- (2) Treatment of the solution to precipitate the dissolved gold in the metallic form.

The ore is crushed to the degree of fineness that has been found to give the highest degree of extraction. It is placed in the leaching vats for treatment. The size of the vats is only restricted by the amount of ore to be handled. Large vats are more economical than a number of small ones equal to the same capacity. These vats are constructed from brick and cement or concrete and timber. Whatever be the material of the vats, they must be constructed with a false or filter bottom. In small vats this is of "duck" resting on a wooden grating, in large ones it is of canvas burlap or cocoanut matting, supported on wooden filter slats. The vats are filled with ore and the cyanide solution, of proper strength, is added until the ore is covered. The time of treatment depends on the ore, lasting from 24 hours to 20 days. The percolation is continued so long as the solution shows a profitable extraction.

The cyanide solution containing the gold

is next passed through a series of vessels containing zinc shavings. The gold is precipitated by the zinc in the metallic form. In order to effect a clean-up, the cyanide solution is shut off from the precipitating boxes, and a stream of clear water is passed through them. The zinc shavings are shaken so as to detach as much of the gold slime as possible, and cause it to collect in the space under the false bottom. The gold is removed and the zinc compartment is refilled with zinc shavings. The fine slimes which have been collected from the various compartments are dried, calcined, flued and run into bars of base bullion, which is shipped to the mint.

PRACTICAL CONDUCT OF THE PROCESS.

In considering the treatment required for any given crushed ore or tailings, the following points have to be observed:

- (1) Is the gold it contains coarse or fine?
- (2) Is the material acid or neutral?
- (3) What metals, with a strong affinity for cyanogen, does the material contain?

The degree of coarseness of the gold determines in a large measure the length of time required in contact with the cyanide solution for dissolution. In pyritic concentrates a long time is required for solution of the gold. The gold is generally coarse and present in large quantity. It requires time for the solution to penetrate between the laminae of the pyrites crystals. The small quantity of solution which can penetrate such interstices will be held by capillarity, under these conditions diffusion will naturally be slow.

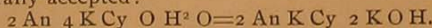
By "acidity" of the ore is understood the product resulting from the partial oxidation of the pyrites. These products consist chiefly of free sulphuric acid, soluble metallic salts. These products are destructive to cyanide, forming with it compounds useless in the extraction of gold.

There are certain compounds found in gold ores, such as copper glance, that consume a large quantity of cyanide. In many cases, a very weak solution of potassium cyanide seems to exert a peculiarly selective action upon the gold in this class of ore.

The "acidic" tailings in many cases can be worked by neutralizing with an alkali, or alkaline earth, before treating with cyanide.

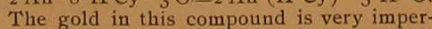
NOTES ON THE CHEMISTRY OF THE PROCESS.

Elsner's equation for the dissolution of gold by cyanide of potassium is the one generally accepted:



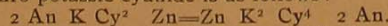
According to the above formula, an atom of oxygen is required in the reaction. Several investigators have experimented upon adding oxydizing agents to the filter vats. With some ores the oxygen-yielding compounds give a higher degree of extraction. In most cases the oxygen of the atmosphere is sufficient to supply the amount required.

The reaction which takes place when hydrocyanic acid dissolves the gold from said tailings may be represented by the equation:



The gold in this compound is very imperfectly precipitated by zinc. If caustic soda or potash is added precipitation is produced.

In theory, the precipitation of gold from anro potassic cyanide is as follows:



The precipitation is more rapid in the presence of an excess of potassium cyanide, for electro-chemical reasons.

CHLORINATION PROCESS.

One of the first steps in the process is the roasting of the ore. A mixture of the sulphides of iron, copper, lead and zinc will ab-

sorb a large quantity of chlorine. The gold would not be acted upon until the other metals present were satisfied with chlorine. To prevent the large absorption of chlorine gas, the ore is roasted to expel sulphur, arsenic and antimony. The metals are changed to oxide. This is done in large, heated furnaces, through which a current of air is passing. If the oxides of copper, calcium or magnesium are present, salt is added in roasting so as to satisfy these metals with chlorine. From the furnace the ore is sent to the cooling floor, where it is allowed to cool.

The chlorinating plant consists of a chlorinating barrel, filters, storage tanks, precipitating tanks and settling tanks.

The chlorinating barrel is a lead-lined cylinder, provided with suitable journals and driving pulleys, and with a charging door and test valve. It should make about fifteen revolutions a minute. Before charging with roasted ore sufficient water is put in the chlorinating barrel to make an easy flowing pulp. From 100 to 125 gallons will do for a ton of ore. A sufficient quantity of chloride of lime and sulphuric acid is added to convert all the base metals as well as the gold into chlorides. The charging door is closed and the barrel rotated four to six hours.

By means of the test valve the existence of free chlorine is ascertained, and if free chlorine is present, the ore is thrown direct on the filter and leached until all the chloride of gold is removed from the pulp.

The filters have their bottom covered with perforated glass tile; on this rests a graded filter bed topped off with clean river sand.

The solution from the filters is stored in tanks. From the storage tanks the solution passes into the precipitating tanks where it is treated with ferrous sulphate, the gold is precipitated as metallic gold and settles to the bottom of the tank. The gold is collected and washed free from iron salts, dried and melted with soda and borax in graphite crucibles into bullion.

ELECTRO-CHEMICAL TREATMENT OF ORES.

The experiments described in this paper were undertaken to show the efficiency of electro-chemical processes for extracting gold and silver from rebellious ores and tailings. There are many conflicting opinions and very little literature upon the subject that is founded upon experimental data.

The experiments were made in a rotating barrel. The barrel is lined on the inside with an amalgamated copper plate. This plate is connected with the negative pole of the Edison cells and forms the cathode in the barrel. All around inside of this and close to it, there is placed a row of iron blades. These blades are separated some distance apart so that the ore can pass freely between them and come in contact with the amalgamated plate. The blades are insulated from the barrel and are connected with the positive pole of battery.

Any free gold in the ore comes in contact with the amalgamated plate and is retained by it. The ore comes freely in contact with the anode and the solvent used becomes very active under the influence of the electric current. The gold and silver that goes into solution is at once deposited on the amalgamated plate and the solvent is free to dissolve more of the precious metal.

Sodium chloride may be added to reduce the resistance or increase the conductivity. When the liquid contains only sodium chloride ore to ten percent, the primary decomposition will be sodium and chlorine. The sodium is liberated at the cathode, under the mercury, and forms sodium amalgam, when

the current ceases this amalgam acts on the water, forming sodium hydroxide and liberating hydrogen. The chlorine that is liberated at the anode is taken up by the solution and neutralized by the sodium hydroxide at the cathode, forming sodium chloride and sodium hypochlorite. The sodium hypochlorite acts on the potassium cyanide present oxidizing it into cyanate, a salt easily decomposed and useless as a solvent.

Small quantities of sodium are often added to mercury to prevent flouring in these experiments; it is provided electrolytically. The surface of the mercury being strongly polarized by both the electric current and the sodium, the particles of float gold and silver will be readily seized by the mercury when they approach the surface. The surface tension is altered by the difference in electrical potential between the surface mercury and the liquid, and this helps the particles to come into actual contact with the mercury. This is what happens when flouring is prevented and a metallic contact with mercury takes place.

NOTES ON YMIR MINE AND ITS MILL PRACTICES.

BY S. S. FOWLER, S. B., NELSON, B. C.

Subsequently to the deposition of the ore of both these bodies, the dykes were intruded and the fractures which rendered their presence possible seem to have been followed by movements more or less in the direction of the plane of the vein and in parts, along both walls, with the result that other fissures were formed, some extending for some distance into the footwall country, diagonally to the strike of the vein, and others along the hanging wall. These last fissures are filled with a very nearly barren white quartz, carrying at times sharply angular fragments of slate.

The later movements have also created fractures in the ore body, along one of which at least, where there is a local concentration of galena, oxidizing action has been going on with the result of producing a band of "carbonate" affording fine specimens of Cerussite and a local but marked increase in the gold values, the gold being largely free but invisible except after careful panning.

Another effect of these movements is the faulting and the fracturing of the dykes, and their being more subject to alteration. This faulting movement is in the direction of the plane of the vein, but nowhere has it been extensive, *i. e.*, not more than 3 or 4 feet. The material along the plane is usually so soft as to make it difficult to get specimens showing striation, still we have one from the hanging wall with two distinct series of striæ.

Stopping has not yet proceeded far enough to enable us to know all we desire of the structural features of the vein, but before leaving this part of our subject, I may cite an interesting freak of the larger of the two main dikes we have met with. In the No. 2 level, a four foot dike comes squarely up to the foot wall, where it turns a right angle to the left along the wall, and so continues, gradually curving to the right for 20 feet where it crossed the drift squarely. Going through the dike we found slate, and cross-cutting on the other side of the dike, we found it suddenly turning again and butting against a fault fissure, nearly filled with two feet of calcite. Just how or where the dike proceeds into the hanging wall we do not yet know, nor is it specially important. The main point to be observed is that our failure to closely examine what we presumed to be

the footwall rock led us astray, and into an expense which was useless at the time except to reveal an interesting structure.

We have not yet developed any special mining system at the Ymir, nor have so far encountered the necessity of any, for the first stopping was done only in March last, and since the first of June our mill has been principally employed in handling an accumulation of several thousand tons on dumps.

However, the fact that much of the ore body is too wide for stulls, and that good mining timbers are scarce, together with the presence of what will probably prove to be a not too strong hanging-wall, will undoubtedly necessitate a system of combined crib work, filled with waste and square setting.

The mine produces two general classes of ore; first, mill stuff; second, crude ore. The former is sent directly to mill by a Hallidie ropeway, about 2,400 feet in length from the mouth of No. 3 tunnel, *i. e.*, the lowest which has exit to the surface. The second general class consists of two sub-classes—crude galena and oxidized ore or carbonate. Both of these are small in amount compared to the milling ore, and they are shipped directly to the Hall Mines smelter at Nelson, the crude ore in bulk and the carbonate in sacks. Milling material on reaching a bin at the lower tramway terminal passes through a No. 3 Gates Crusher, which reduces the coarsest to pass about a 2-inch ring. Below the crusher is a 200-ton bin from which the feed passes by a tram car, after being weighed into the battery bins proper. The crusher and tram terminal are in a separate building, but the cost of tramming is a very small item.

The mill proper embraces a 40-stamp 850 lbs. battery, arranged in four sets of ten stamps each, eight silvered copper plates, 56 inches by 12 feet, four sets of 4-cone classifiers, and 6-foot Frue vanners. This plant is driven by water with a 6 feet Pelton wheel, under 415 feet net head, the crusher being separately driven by a 24-inch motor, under 320 feet head. The stamps make from 96 to 102, 6½ inch drops per minute, and with an average issue of 7 inches, crush a little over a 100 tons per diem through No. 9 diagonal slot screens, *i. e.* slightly over 2½ tons per day per stamp.

We have found a tendency toward banking of the pulp at each end of the mortar, to avoid which we give the first and fifth stamps about 1½ inch greater drop. I may also say that we intend trying the method of the introduction of feed water advocated by Mr. Bernald McDonald, which formed the subject of an interesting paper read before the Canadian Institute Mining Engineers.

In operation we employ one inside plate, and on it accumulate about 40 per cent of our gold. The outside plates slope two inches in a foot, and on the upper 24 inches of their length we gather about 80 per cent of the recovered free gold which passes the screens. The lower part of the plate, (10 feet) we find to be very valuable, and it passes an extremely small amount only of free gold. An interesting feature of the operation of the lower part of the plate is that the amalgam on that portion is very much higher in silver than that gathered elsewhere, and proportionately lower in gold.

Zinc blende and pyrite cause us no trouble in keeping the plates clean, but the extremely small size of the galena particles, together with their gravity causes them to catch in the minute depressions of the amalgam and gradually to cover the latter. For this reason our plates are dressed every six

hours, and thus we are able to keep them in excellent condition. This result we consider good work in view of the fact that our concentrates amount to 6.2 per cent of the mill feed, and contain over 14 per cent lead and 10 per cent zinc.

The bullion produced averages about .58 gold, .40 silver, .02 per cent. base, showing practically no amalgamation of lead, but the presence of a considerable amount of silver.

Without disclosing the gold tenure of our tailings, I may say that they are most satisfactory, and in fact are remarkably low when we consider the apparent baseness of the ore. Of the total gold and silver recovered, we find in the bullion 82 per cent of the gold, 27 per cent of the silver, and in concentrates 18 per cent of gold and 73 per cent of silver.

The ore, thus far, has shown itself quite free from acids and from arsenic, antimony and tellurium, a fact which is partially reflected in the very low consumption of quick silver, *viz.*, about two tenths of one ounce avoirdupois per ton crushed.

Other properties in the vicinity of the Ymir are not yet sufficiently developed to show whether this mine is exceptional in its size or the character of its ore, but it seems highly probable that the success which seems in store for it will have much to do toward bringing the Salmon River country into prominence.

GEOLOGY OF THE COCHITI.

WM. JENKS.

(Continued from our issue of Jan. 15, 1900.)

It is not to be supposed that the mineral deposition was necessarily contemporaneous with any disturbance, though great mineralization and great disturbance go hand in hand; without faults, fissures and contortions, mineral is usually absent.

The fissures were formed and filled at some earlier period, perhaps archæan, metamorphic, sedimentary and previous to the introduction of the intrusive porphyries, as these do not interfere with the continuity of the veins. The denudation was long continued and occurred primarily in an enclosed area of water, evidences of which we find in the rounded pumiceous pebbles now to be seen in numerous places in close proximity to the mineral veins. As the pebbles will float in water, it also shows that the end came suddenly, or they would have been carried away by the receding waters. Another point to be gained from this is that it seems probable that very little erosion took place after the washing away of the great bulk of the tufa, nothing more than the ordinary atmospheric wear and tear.

It is impossible to speak with confident exactness as to the age of the different eruptions at the two ends of the line of fault fracture examined and commented upon in this paper. The age is undoubtedly post-cretaceous, probably tertiary as the lavas of nearly identical basic character are seemingly coming from vertical depths, through, and capping the cretaceous formation. At the Abiquin end it has the appearance of a great dike running thorough the country. There the lava is more dense and is said to carry a little silver; at the Albuquerque end, I am reliably informed that it carries, or there is in its vicinity, a little gold.

The elevation of the extreme points is not seriously different, and eventually they may be proved to be gold bearing.

In the Jemez Range of mountains, of which the Cochiti Range is relatively a part, the pumiceous tuff was erupted during or at

the close of the jura-trias period. We find there in as clear order a base or central axis of red granite, carboniferous limestone, permian and jura-trias red and white sandstones, and variegated shales with the superincumbent pumiceous tuff.

In the Cochiti mineral district, gneiss, an acid rock, and diorite, and older eruptive basic rock, varying in color from light to dark green, occupy the place of the granite. The limestones and sandstones are totally absent, but as stated before the pumiceous tuff caps the older metamorphic rocks, and the proximity of and connection with the Jemez Range, certainly leads us to suppose in the absence of the sedimentary pointers that the two ranges are of the same age, and hence that they are jura-trias or pre-cretaceous.

The Cochiti District has a perfect and beautiful system of veins and spurs all leading to and apparently uniting with a mother vein.

It is at the intersections of the spurs with the mother vein, and other points where there was the least obstruction to the escaping and ascending waters, that we may expect to find the more valuable mineral.

The veins have all the characteristics of true fissures, irregularity in that they sometimes pinch down to a mere seam and again widen out, sometimes a filling of wet mud and broken quartz good ore above and probably below. The foot wall is usually smooth, the hanging wall uneven.

As to permanency in depth, a recent authority states: "It is generally conceded now, that fissures are, comparatively speaking, surface phenomena, and that below a certain depth, where plasticity and flow of rocks under pressure come into play, open spaces cannot exist. This limit Prof. Helm, for instance, places at 16,000 feet, while Prof. Van Hise, basing his consideration on the strength of rocks, arrives at 33,000 feet as the maximum limit for hard rocks in which fissures can exist. Even the lowest of these estimates far exceeds the depth of practical mining. In considering the probable permanence of a given vein, its general character must be taken into consideration. Continuous, well-defined outcrops, and wide bodies of quartz are in general, good indications of the maintenance in depth, as is also any evidence of strong faulting and movement. Some quite extensive veins, though, have relatively short outcrops."

Cochiti, the center, was probably at some period lower in altitude than the ends and was covered by an inland sea or lake or as previously remarked, it may have been the bed of an ancient Rio Grande. How apt the quotation, "Every valley shall be exalted and every mountain and hill shall be made low."

The fissures as we now find them were or had been formed of quartz. Porphyry became the vein matter, being probably an altered country rock, that is, metamorphosed sedimentary and not due in any sense to extraneous sources. This large area was afterwards occupied by the wet volcanic tuff or tufa, the course of the river changed; and the bed of the lake partly filled.

The water was hot silicated, chlorinated and carbonated, *i.e.* a chemically changed water.

The intrusive porphyries then begin to appear gradually lifting up and draining the inland sea, breaking up the great mass of tufa, and erosion takes place.

Descending chemically charged hot waters permeating the whole country, are still further heated, and their valuable load increases in their downward leaching passage, until they strike a point where pressure has made

the rocks impervious, or heat has caused it to seek points of lesser resistance; *i.e.*, fissure veins, to return at lower level to the surface.

The water in its passage upward to the surface decomposing and displacing the soda feldspar of the quartz porphyry and refilling the cavities by substitution and concentration from its burden of the precious metals. This is called the metasomatic theory and applies to many deposits both primary and secondary.

The small percentage of iron and the nearly total absence of copper, lead, zinc, etc., in the Cochiti ore, rather tends to prove that they had their origin in acid rocks. At the same time there must have been other influences at work giving some veins a greater proportion of gold than others. Who can say that our transmuters of silver and other baser metals into gold under various conditions of heat, pressure, etc., are mistaken? A similar influence may have been at work here.

From the southern end of the Cochiti country nearly to the Chama River and onward this great and persistent fault fissure can be followed and recognized with very little exertion. It is so plain that he who runs may read. I do not pretend to say that it is mineralized everywhere. That would be expecting too much. Like all other mineral countries it has its pay and barren shoots.

The only economically valuable mineralization that I know of at present is in Pino, Colla and Peralta Canyons.

PIERCE COUNTY MINES.

(Began in our issue of Jan. 1st 1900.)

NO WORK IN TAHOMA DISTRICT.

"The Tahoma Mining district we did not visit as no work is being done there at this time. A new trail is being built from Fairfax to the Ironclad group of mines, belonging to the Washington Co-operative Mining syndicate, which, when completed, will be fifteen miles long. It is now within one and one-half miles of the mines and will be completed in the spring. A half way station has been constructed at the headwaters of Voight creek.

"We are informed by those interested in the district that the veins are contacts between porphyry and diorite, the ore being a chalcopyrite with calcite gangue, being from four to six feet wide on the outcrop and having been traced for 1,000 feet.

"One hundred feet of tunnel has been driven on the 'Tacoma vein', which is situated one-half mile above the Ironclad on the Mowich river, discharging good solid ore the entire distance, which assays Copper, 33.50 per cent; silver, 9 oz.; gold, .05 oz. Total \$120 per ton.

SIMILAR TO CARBON RIVER.

"It is similar to the Carbon river ore except horn-blend is absent. The outcrop on the Ironclad carries 17 per cent copper and some gold and silver, giving a total value of \$65 per ton. There are about fifty tons of ore on the dumps. It is calculated to have these mines operated the coming summer and the ore shipped to Tacoma via Fairfax.

"Locations in Tahoma district are: Tacoma, Tacoma Extension, Niger, Gyp, Gyp Extension, Concentrate, Mowich, Ironclad, Hope, Wild Cat, Snow Shoe, Ironclad Extension.

"The Glacier basin has about fifty claims, but we were not able to get the names.

REPORT OF C. C. SNOW.

"Mr. Phil. Reese and Mr. G. B. Monty, special committee, Chamber of Commerce and Board of Trade, to report on Carbon River and Tahoma Mining districts, city. Gentlemen:

"In compliance with your request, I here-

with submit from a practical miner's standpoint the result of my examination of the Carbon River District, made in Sept., 1899.

"The country formation in the district is granite, porphyry, porphyritic granite and some blue and yellow quartzite.

"The veins are found in the granite formation and are true fissure veins, which show they increase in value and width as depth is obtained. The work which has been done since I was there proves the above statement beyond a doubt.

"The veins are readily traced on the surface by outcrops and the granite impregnated with hornblend. The hornblend in this district carries copper, and runs to copper, as it does in only a few camps in the United States and quite often you find quartzite running with, or close to the vein.

NO TROUBLE TO FOLLOW VEINS.

"The formation is such that I have no doubt there will be no trouble in following the veins of ore to great depth, after getting below the surface a short distance.

"I found in several places small lakes, which at one time were craters, and the numerous veins running through the district radiate from these lakes or craters, showing that at one time there have been great eruptions, causing great fissures through the formation, which were filled at that time with ores by a chemical process best known by the Creator.

"The facilities for working the veins are as good as a miner could wish for, for on almost every claim located there is a show to open the veins with tunnels running with the ore on the veins. There are numerous cross veins which can be drifted and developed from the working tunnels.

"In nearly every instance the tunnels would gain depth very fast, giving a great amount of ore to be stoped out. Of course, the longer the tunnel the faster the amount of ore would figure up.

"Water power is in abundance for any and all kinds of machinery for mining and milling; also for electric railroads to transport ores or matte. The mines are very accessible being only eight miles from Fairfax railroad connection, at which point there are very fine coal mines, the coal being a coking variety and coke being made.

FAIRFAX THE CENTER.

"As I see it, Fairfax is the central distributing point for the district, and is a very desirable point to build plants for reducing the ores of the camp.

"Water power can be had at Fairfax as well as at the mines for running electric roads, or a plant could be located at each end.

"Taking into consideration the formation of veins of high grade ores the facilities and accessibility of the Carbon River Mining district its future is assured.

"The Washington Co-operative Mining syndicate, with their many valuable locations, some of which are now almost ready to be classed among producing mines, as well as others who are developing their mines steadily, with flattering showings, are worthy of every encouragement.

"I claim that ere long, if properly managed, they will be among the leading producing and dividend paying mines of Washington.

"The ores of the camp are generally chalcopyrite, assaying from 10 to 35 per cent copper and carrying from one to three hundred dollars in gold and from five to three hundred ounces of silver per ton, and are practically self-fluxing."

C. C. SNOW.

MR. CONE'S OPINION.

"Mr. Phil Reese and Mr. G. B. Monty, spec-

ial committee Tacoma Chamber of Commerce to report on Carbon River District: "Gentlemen:—In reply to yours of the 5th inst., will say: I spent the months of June, July, August, September and October in the field adjacent to and tributary to the Carbon river, in Carbon River mining district, prospecting and visiting properties in the district.

"Passing my opinion, after twenty years' experience at the same kind of work in California, Utah, Nevada and Arizona, I have no hesitation in saying that for the amount of prospecting and developing that has been done up to this time, I have never visited a more promising district, and I believe that every effort possible should be made to keep the eyes of the public open to the facts, and to create a general interest in the welfare and development of the camps.

"To give you a full and detailed account of all the prospects I visited, their characteristics and peculiarities, would be tedious and of no particular interest to you, I believe; so I will just make a brief mention of the different localities, what has been done and what has been shown.

WHERE MINERAL BELT IS.

"After leaving Fairfax one sees very little sign of mineral for the first three miles. At Nicholson's ranch, however, there begins to be considerable outcrop of porphyry and other mineral indications. Mr. Wilkins, superintendent of the Leola Mining company, has acquired several claims on this belt. Continuing on up the Carbon river on the north side there is more or less indications of mineral, and many locations, but no prospecting has been done for three or four miles till we come to the Irish brothers and Grayson group of claims. The Washington Co-operative Mining syndicate's trail passes through this group of eight claims. This group is located on three distinct parallel veins, two of which I visited, each showing from two to five feet of ore on the outcrop of veins. About forty feet of a crosscut tunnel has been run for the vein but it had not been reached at the time I visited the group.

"Adjoining this group is a group of twelve claims belonging to the Leola Mining company presumed to be located on the same vein as the Irish brothers' and Grayson group; this group I did not visit.

CANADA CREEK BASIN.

"The next couple of miles brings one to the Canada creek basin, of which much has been said by more able men than myself. Here is located the Sunrise, Clipper, Sunnyside, Summit, London, East Lake, Margaret, O. K. and many others worthy of mention on both sides of Canada creek. I can best describe this basin as one vast field of granite traversed by a myriad of iron, copper and quartz veins, ranging in size from a few inches to many feet, and ore outcroppings on the surface that carried from two to thirty per cent copper with some gold and silver. In every case on the many claims I saw each day work, or every foot of opening made, improved the looks as well as value of mineral.

"Leaving the upper Canada creek country and crossing the ridge south, one comes into the Chenuis creek, which is parallel to Canada creek and empties into the Carbon river, and is known to many as the source of one of Tacoma's defunct water works schemes. This part of the country has been but little prospected, the Buckley Mining & Development company being the only people interested in this section. They have one group of claims just a mile and a half south of the Surprise

and Clipper mines. One of their claims shows a vein sixteen feet wide that runs 5 per cent copper. Very little development work has been done as the claims have only been discovered last summer. East of this group and two miles due east of the Surprise the same company has a group of six claims on the north fork of the Chenuis creek. This group showing four parallel veins, having an easterly and westerly course. There has been no development work done on these claims.

NO PROSPECTING DONE.

"A vast area of country lying south and east of the Chenuis creek for a distance of six or eight miles has had no prospecting whatever done, so until the country between the Carbon and White river glaciers is reached there is no development. Mr. Fred J. Chamberlain and Mr. James Sanders have been the principal prospectors in this section, which, by the way, they reach by following the Carbon river up to the glacier, and then up the south or east side of the glacier to their prospects. The district is doubly interesting on account of its situation. It is the highest of all the mineral locations, guarded for years by both the Carbon and the White river glaciers, traversed by many veins of both quartz and iron. On one vein in particular there has been eleven claims located end for end, or in other words a vein that can be traced for a distance of 16,500 feet by its outcrop. These veins vary in width from fifteen inches to five feet. The main vein shows ore in at least twenty open cuts throughout its length that assays from a few dollars to as high as \$138 per ton. The men interested in this section are Fred J. Chamberlain, James Sanders, James Forrest, James Farrell, Dr. Goble and others from Tacoma.

IN THE TAHOMA DISTRICT.

"In the Tahoma mining district, on the southwest side of the Carbon river, and accessible only through the Carbon river route, are a number of claims which will be the easiest to describe by beginning at the glacier on the Carbon river and come down. The first group is half a mile from the river on Traitor Creek. This group belongs to Messrs. Watson, Pitts and Allen, of Orting. Within the last month they have made an entry about 30 feet long mostly through slide and debris. They found the vein in place and the ore running 7½ per cent copper and some gold. The vein is 4½ feet in width. Still further south, up the creek, is another group of claims on a magnetic iron vein that runs 68 per cent iron. I did not visit this vein.

"From Traitor Creek down the river for five miles no prospecting whatever has been done until Mr. William Evans' group of fifteen claims is reached. Mr. Evans, Mr. E. E. Brehm, Mr. Fritz Hoosa, Nartin Steel and others are located in this section, and judging from their samples, some very good claims exist there. I only visited one claim, the Cleo, and this claim shows five parallel veins.

"Other claims are located on down the river for a couple of miles. They belong to the Irish brothers, Mr. Seton and others. I did not visit these claims.

"The country rock of pretty much the whole country is granite, the veins are true fissure veins and have a pitch of about 70 degrees.

"Such is, I believe, a general outline of the whole country, and my opinion of its stability.

C. EDWARD CONE,
"Practical Miner and Prospector."

(To be Continued.)

CORRESPONDENCE

ARIZONA.

(From Our Special Correspondent.)

PHOENIX, ARIZ., Jan. 21, 1900.

A smelter is to be erected on the Columbia group of claims near Jerome, and midway between that town and the famous Equator Hill properties. The Columbia is one of the companies recently organized for the development of copper properties in the Verde District. The capacity of the smelter has not been decided yet, and is dependent upon whether the company concludes to bid for custom work. It is likely that the smelter will undertake custom work, anticipating a large output soon from adjacent mines which will be restrained from shipping ore on account of the excessive freight rates. Among the promising holdings in the immediate vicinity are the News, Deatur, United Verde Jr. and the Black Hills groups.

The Black Hills people claim they have struck the Mammoth ledge of the United Verde, Senator W. A. Clark's wonderful copper mine in Jerome. The Black Hills Company is a concern organized by R. A. Thomas of Los Angeles, formerly president of the First National Bank of San Diego, and founder of the town of Escondido.

The several Jerome companies operating close together have been boring and sinking into one large hill in search of the continuation of the United Verde reef, which always has been thought to extend in that direction. The Black Hills Company has claims on the apex of the hill, and extending more than half way down to the base. The upper shaft is directly under a limestone capping, similar in character to the capping which overlies the main shaft of the United Verde, and the character of the ore encountered, at a depth of seventy feet, is said to be identical with that of the sulphides, or "raw stuff," taken out of the United Verde.

J. Ralph Dillon, who has been superintending a great deal of development work in the Verde region, backed by Scotch capital, has returned to Arizona from an extended trip to the east and will push work vigorously. He is interested in a deal for the opening of the Winningham group of copper mines in Mesquite Gulch. This is one of the first properties located in the district. The Crandell group, another early location is being negotiated for.

Your correspondent has been reliably informed of the intention of the United Verde Company to erect an immense water power electrical plant, at a cost of about \$200,000. The plant, if built, will be located about eight miles from the company's smelter in a small valley in the direction of the Verde Valley. A company, organized under the laws of California, has secured an option on what is known as the Page Springs, where water power will be developed for operating the electrical plant. One of the heaviest stockholders is Joseph L. Giroux, superintending the United Verde Mine, and all the stock is thought to be controlled by W. A. Clark. The plant is designed to furnish power for the operation of accessories of the United Verde smelter and works and for lighting the town.

G. W. Hull, a well known Yavapai County mining man, has sprung a surprise, which later may develop into an actual sensation. Four years ago he visited Congress, Arizona, and made a general survey of the country. The Congress Gold Company had located all adjacent ground to the east of the Congress Mine, but to the west, by an oversight, it is

said that certain claims were not covered. Hull located five of the claims, which he has held ever since, and he recently managed to purchase six more. They are in a solid bunch and, Mr. Hull claims, overlie the Congress Ledge. If his judgment is correct, obviously, for a moderate sum a very valuable holding has been acquired. John Argyle, of Prescott, is associated with Mr. Hull in the enterprise, and steps are being taken to organize a stock company, and secure working capital for the erection of a plant for the treatment of ores, although the property has not been fully exploited.

There is a report from Congress that a new body of ore has been encountered on the 2600-foot level, of more than usual richness. It is known that the Congress Mine is getting into richer ore at depth, and it is said that enough pay ore is now blocked out to supply the milling plant for fifteen years. The Congress Gold Mine and the Pearce holdings are running a close race for first place in the list of Arizona's gold producers, and the Pearce District threatens strongly to take the lead, unless an enterprise similar to the one now being launched by Messrs. Hull & Argyle proves successful and figures materially in the output of the Congress District.

In line with the chance location of the eleven claims at the Congress Mine is the action of Mr. J. J. Fisher, Deputy United States Mineral Surveyor of Prescott, who some time ago, in the course of his duties discovered what is believed to be a very valuable fraction of ground between the two claims of the United Verde Company at Jerome was uncovered by locations. Last summer he slipped into Jerome and posted notices on the ground, which were recorded before the United Verde Company could ferret out his intention. The surface of the claim is about 450 x 150 feet, and lies on the opposite side of Bitter Creek, and just beyond the great roast heaps of the United Verde at 300-foot level. The company recently made overtures to Mr. Fisher for his property, but he holds it at \$25,000, and that amount the company is reluctant to part with. Mr. Fisher now has men sinking at a point where he calculates the United Verde Ledge dips into his location.

There is talk at Prescott of building a giant tunnel to connect Lynx Creek with the Big Bug District. According to plans just mapped out, the tunnel, if constructed, will be 6,000 feet in length, and it will put the Lynx Creek Mines in direct communication with Prescott by rail. It will pass under the Mud Hole Mine, cutting the shaft at a depth of 400 feet. The tunnel would cause all the ores to go over on the Big Bug and thence to Prescott by rail, and its completion probably would cause a reiteration of the movement for building a smelter in Prescott.

The Whipsaw Copper Mining Company, operating the old Whip Saw Mine, in the Castle Creek District, sixty-five miles north of Phoenix, is now employing fifty men for the development of its holding, and is erecting a 60-ton water jacket smelter. The operators are developing several leads of ore, which on an average assay about 10 per cent copper and carries gold. The main shaft is down 165 feet, and the property is being opened at another point by a tunnel in 400 feet. Two short drifts running in opposite directions from the face of the tunnel are in oxide and carbonate ore, which runs from 10 to 20 per cent copper and carries about \$10 in gold.

The Whipsaw property originally was worked for gold, more than ten years ago.

On account of a report submitted by Thomas E. Farish, a well known mining expert, who declared the mine to be essentially a copper property, the Whipsaw Copper Mining property was organized less than a year ago, to take up the development. William Christy, President of the Valley Bank of Phoenix, is at the head of the company.

The mine now gives evidence of developing into an important copper producer. The water jacket smelter, now under course of construction, is being built for the purpose of treating the large quantity of surface oxides and carbonates. There is reason to believe the property will be in sulphide ore when better developed, and it is the intention of the company, when the sulphides are encountered, to put up large smelting works.

A strong movement is on foot for the building of a wagon road between the Riverside and Mineral Creek Districts and Phoenix. A sum of money has already been subscribed here for the purpose, which gives assurance of the completion of the project. The object is to afford an outlet for the numerous new and valuable mines of the regions surrounding Florence and Riverside, about 60 miles from Phoenix, and to make of this city a supply point.

L. D.

CALIFORNIA.

The Manvel Gold Field.

(From Our Special Correspondent.)

MANVEL, Jan. 22, 1900.

EDITOR JOURNAL:—The Manvel gold fields are on the New York Peak of the Providence Range of Mountains, and only two to three miles from the California Eastern Railroad station of Manvel.

I have been referring to State Mineralogist J. J. Crawford's reports, 1896, as to the Providence Mountain Range, and especially in the New York Peak District. He says: "The geology of the locality is simple, consisting of quartzites, in part conglomerate, mica schist and limestones, resting on a mass of intrusive granite. * * * The sedimentary rocks have a curving strike around the granite core of the New York Mountains. Dykes of rhyolite and feldsite have intruded the sedimentary rocks and the topography of the region in the vicinity of the south end of the New York Mountains suggests the possibility of faults. * * * These New York Mountains are an extension of the Providence Range, though disconnected. Veins and mineral deposits occur at several places in the sedimentary rocks which flank the main granite core. The axis of the range is northeast and southwest. * * * The nuclear mass of the range is grano-diorite, which has uplifted the older sedimentary rocks on its flanks; the upper portion or dome of the great anticline has been eroded, leaving only the very rugged line of serrated peaks and ridges flanked on both sides and about the ends of the range by quartzites, limestone, mica schists and conglomerates. * * * In granite, which is a portion of the great mass of New York Mountains, are large quartz veins containing gold and copper sulphides. * * * A variety of eruptive rocks have intruded the sediments at many places; local faults and folds are numerous."

The north end and easterly side contain the Manvel gold fields; and the explorations in these sulphides led to the recently discovered bonanzas of sulphide ores, occurring as shoots in the feldsite veins in these granite fields. On opening there is discovered the

sulpho-telluride character of the ores, those in the quartz rather dark stained, and the feldsites of these veins are a pegmatite, also carrying pay gold values.

I have referred to these facts and conditions because of several pretty stories I have read about the St. George Mine and who is yet the real owner of that property. In 1896 J. W. Mackey et al. of San Francisco were the owners, and A. G. Campbell of Salt Lake, lessee. It seems the Flood estate was included in the "et al." names of the owners, but on Dec. 30, '98 and again on Oct. 29, '99, a Los Angeles paper referred to the St. George Mine and the big strike, but then it was proclaimed to be the property of Greene Campbell of Salt Lake, the lessee having become owner for a consideration of then, \$3100. Soon the 10-foot ore body was broken into and it milled \$35 per ton, as reported. But the elevating part of it is, now, that the St. George is under bond for \$250,000. It is now, therefore, "agreeably discovered" that the mine is worth \$250,000 instead of the \$3100 then. But where are Mackey and the Flood estate? Did they really sell all out to A. G. Campbell? Who can answer this question propounded to me? I know nothing of the transfer details.

But I do know Campbell broke open the ledge of values in the mine by crosscutting and sinking. And it is more of these sinkings and crosscuttings that are wanted in the New York Mountains.

Five hundred bars of lead silver bullion were landed here for shipment to refinery by the Tacopah Smelting and Mining Company.

Two carloads of copper bullion have gone to the market from the Ivanpah Smelting and Mining Co., shipped from Manvel.

Two cars of lead ore have gone to smelters from Manvel, from Potosi Mines in Nevada.

Ores arriving for shipment now are lead, copper, gold and silver.

R. S. Seibert and T. M. Brown have been talking about "fine points of the law," and real property of late. Brown seems to be on top and backed by the United States Land Office officials and the Interior Department at Washington as well. Their discussion has become of interest to others. The feast is in order soon, at least it is to be hoped so, for the townpeople are concerned in the future of Manvel as a mining camp residence.

The Gold Bronze Mine at Vanderbilt has another bonanza of mispikcle ore, below the water level that is a beauty, refractory and smelting product, and it takes a first class assayer to reveal the true values. It is high-grade ore, all the same, and very beautiful.

Crawford's report naming the nuclear mass of New York Mountain "grano-diorite" and it is likely correct, put me to my references in comparison. I find that Waldemar Lindgren in his reports on the gold quartz veins of Nevada City and Grass Valley Districts, California, shows that the mass of grano-diorite at Nevada City and Grass Valley are the rich producers of gold there, as circulated by the U. S. Geological Survey Department of the Interior, 1896. There the definition of grano-diorite is given: "Having a normal granite structure, and a mineral composition of quartz, soda-lime, feldspar, orthoclase, hornblende and nearly always biotite. Titanite and magnetite are nearly always present as accessory constituents, showing a very fine grained micropegmatic intergrowth of quartz." And the point made is this: That here in the Manvel gold field the ores outcropping in shoots compare to those shown by Plate VII specimens showing structure of ore, as ore from the Omaha and Federal Loan

Mines at Grass Valley and Nevada City; but quite like the Federal Loan Mine ore sample. Yet the ore from 14 level of the Omaha Mine at Grass Valley is also a fair type of the Manvel gold field ores, being fine grains of pyrites. There at Grass Valley and Nevada City this ore assayed \$15 to \$40 per ton in gold. This gives a deep mining view of the Manvel gold field as to values and character of the high-grade ores.

Mr. Duvall has a double shift of miners at work executing his 100-foot contract on the Old Shoes Mine.

During the past ten days five new ore shoots, carrying similar ores to the Old Shoes and Good Hope claims, were found.

Gus Hamstadt and partners are now sinking a winze upon the Mineral Queen copper claim, following down the vein of ore.

Eighteen claims have been mill sampled in the past few days and the tests are now in the hands of assayers at Los Angeles, Cal.

Manvel has the oldest mining men actually engaged at work in the West. Mr. A. Winters celebrated on the 16th inst. his 82nd year. Been mining on the desert 50 years. Last year he buried his mother at the age of 102 years. This is only equaled by Mr. Joyce, a miner at Government Wells in Providence Mountains. Joyce is 84 years old and working. His father and mother are still living. Joyce comes from Mechias, Maine.

"Old Man Hunt," who in the past made a great strike at Panamint, has made a discovery of 30 per cent copper ore near Saratoga, about 75 miles west of Manvel.

Gus Hamstadt has struck it again, this time on the west side of New York Mountain Peak, and by the road about 20 miles west of Manvel. He has four claims on one ledge, ore showing from 25 to 100 feet wide, shows copper, gold and silver, and he will put miners to work on it at once.

Real miners are a scarce article at and about Manvel.

A good strike has been made at Shadow Mountain by Mr. Hamstadt and other parties. The ledge is a quartz ore in syenite and porphyry, gold ore of a high grade. The location is on the south side of the mountain. Work will commence there at once. This strike is about four miles north of the old San Bernardino and Ivanpah wagon road, and about 45 miles from Manvel. A. Winters is also operating there, the E Pluribus Mine. He has a tunnel of 300 feet and a shaft of 150 feet. This is a gold mine, ore a white pyrite in quartz. 200 tons of this ore milled averaged \$52 per ton. The veins run north and south, just a little to the west of north. Winters has formed a company to work the E Pluribus group of 22 claims upon which there are about 2000 feet of shafts and in which he says there is now plenty of ground ready for stoping ore. Now the ore is of high grade smelting quality, and there should be a mill near by, but it is over six miles to water. This proposition is gold, lead and copper. And it is quite certain now that the production from Shadow Mountain will be heard from regularly.

Regular shifts are working on the Old Shoes Mine, near Manvel. The work of sinking the 100-foot shaft goes steadily along, every hour of the 24 of each day.

On Jan. 18, 1900, Louis J. Spear purchased the Modoc, the Times, the Little May, the Machias, the Mammoth, the Joe's Wonder, the Good Hope, the Robust, the Columbia, the Olympia and the Horseshoe mines, and the terms of the escrow deed are for more than \$10,000. Another 100-foot shaft is to be

put down upon the discovery in the Good Hope claim and other general work done. Spears also owns in the same group the Grand View, Buena Vista and Vermont locations, all near Manvel on New York Mountain. Gold ore.

Work is in progress upon the Good Hope claim, sinking now on the vein. The ore body of quartz and sulpho-tellurides looks well, and for a newly-discovered quartz ore body assays very well.

The lights are burning all night long now at the Mineral Queen claim of the Gus Hamstadt crowd on New York Peak, where they are sinking a winze on the native copper and native silver ore.

The Potosi lead mines of Nevada are dumping at Manvel shipments of lead ores to the smelters regularly.

Mr. Bunce, owner of the old New York mines, has extended me an invitation to thoroughly examine the mines, and I shall do so. It seems to be a desire of the owners to arrange for a deep shaft working of these mines. There is abundance of water in the 100-foot shaft, and the ore changed there to a more compact, better body of better values.

Quite a number of claims have been laid upon the wolframite or tungsten ore mines near Granite Springs, in the Providence Mountains. These are soon to be opened up.

And it's boom! boom! boom! day and night now upon New York Peak, near Manvel. It is the merry hum of mining—real mining, at that! Another Cripple Creek is opening, and it's gold ores!

The shop for building the big freight wagons will reopen here soon.

GILES OTIS PEARCE, M. E.

WASHINGTON.

(From Our Special Correspondent.)

SPOKANE, WASH., Jan. 20, 1900.

The Red Boy, of Sumpter Camp, have decided to sink a three-compartment shaft. It will be sunk 500 feet below the present lowest level before drifting. The machinery, consisting of engines, hoists, etc., will have a capacity of putting the shaft down 2,000 feet. It is calculated the first cost of the machinery will be \$40,000, and the entire cost of equipment, sinking shaft and drifting to the ledge will cost some \$130,000. At the 500-ft. level drifting will be done on the Golden Monarch and Red Boy ledges, and the crosscut from the bottom of the shaft to the ledge will be over 400 feet. This will give a vertical depth of 1000 feet on the Red Boy and 800 feet on the Monarch ledges.

Palmer Mountain Tunnel Co. will continue the work of running their tunnel further in the mountain, and will install electrical machinery capable of furnishing more than 3,000 horse power, 2,500 of which will be for rent. Their power plant will also be increased and their tram and mine will be lighted by electricity. They also expect to decide upon a plant and proper methods of treating ores.

A 2000-foot crosscut will be run on the Bull Frog, and power will be taken from the Palmer Mountain Tunnel Company eight miles distant to run the machine steel drill plant which will be installed shortly. On the Phantom claim a steam hoist of 1000-foot capacity will be installed.

Work will soon be resumed on the Insurgent Mine at Republic, which is believed to carry the Lone Pine and Last Chance leads. The number three shaft will be continued some 60 feet. It is now in ore.

As soon as possible machinery will be in-

stalled in the Quilp, another Republic mine, consisting of seven-drill compressor, one hundred horsepower boiler, sinking pumps, hoist, etc. The order for the same has been placed with Eastern parties, and in six weeks time is expected on the ground and in running order. The Quilp is one of the best properties in the Republic camp. The ledge is one of the largest, being fully 60 feet wide and it is claimed good values are to be found the entire width of this immense vein.

About 300 feet from number two shaft the new double compartment shaft will be sunk on the Tom Thumb. It will be sunk to the depth of 300 feet before crosscutting to the vein. A new steam hoist and pump will soon be installed. A compressor plant is under consideration and no doubt will soon be ordered installed. They claim nine feet of ore in sight that will average the entire distance of the pay chute, something over 100 feet, fully \$25 in gold per ton.

Republic Mine has nearly 3,000 sacks of ore ready to ship to the smelter, all assorted and of good value. This will be the richest shipment ever made from this camp or this mine. The drift on the 600-ft. level is 300 ft. south of the tunnel. The ledge has narrowed somewhat in the face and the face is likely to be all in quartz shortly. The values, however, are still maintained. Some sixty men are on the payroll.

The machinery for the Mountain Lion Mine is nearly all at the mine, but little remaining at Grand Forks. That already on the ground is being installed as rapidly as possible. Some sixty men are employed, and development work on the mine has been suspended for the present. All is expected to be in running order about March first. As soon as the hoisting plant is ready the work of sinking the shaft to 900-foot level will begin.

The ledge on the south drift of the Lone Pine is six feet wide and has been driven fifty feet. The ore averages about \$80 to the ton. On the north drift the ledge is five feet wide, has been driven some twenty feet, and averages in value \$20 per ton.

The Columbia property, consisting of four claims in Belcher Camp, has one of the finest surface showings of any claim in this section. At the point of discovery there is a three-foot vein giving the highest values of any ore found in this camp. Nine men are now employed and development work will be pushed with vigor this winter. Two shifts will be employed in the tunnel and one shift in the shaft. The tunnel is in 100 feet and the ledge will be cut when another fifty or sixty feet of work has been run. The mineral veins in this camp are in most cases capped with iron necessitating some depth before ore of good grade is reached. Three distinct ledges paralleling each other run the entire length of two claims and it is for the purpose of cutting these ledges at depth the present crosscut tunnel is now being run. Development has been slow as the rock is very hard. The rock in the tunnel carries considerable quartz well weighted with iron sulphides carrying copper. This quartz is identical with the gangue rock of the adjoining claim, the Belcher, and leads one to believe that the richest ore will be found in that rock which is now coming in at the top of the tunnel. This company is fortunate in having good managers and ample funds with which to push work and develop the property on paying basis.

The value of mineral for British Columbia the past year will approximate seven millions, notwithstanding the fact that the Slo-can district was practically closed down for

the entire year. Rossland District mines, gold and copper, \$3,900,000; Nelson District, gold, copper and silver, \$1,250,000; Slocan District, silver and lead, \$1,750,000; East Kootenay District, silver and lead, \$50,000.

At Rossland, the Center Star has declared its first dividend, amounting to \$30,000, which is one per cent on the capital stock of \$3,000,000. Now that dividends have commenced, it is expected to continue monthly payments. They have a large body of ore from which to ship and are now sending to the smelter 1,000 tons a week.

On the 750-foot level of the War Eagle the ore is better and richer than on any of the other levels. It is all of shipping grade and twenty feet wide. Drifts are being run east and west from the shaft. Two parallel pay streaks have been found on the 625-foot level; that on the hanging wall is the full width of the drift and on the foot wall is 35 feet wide. Sinking will be resumed as soon as the station at the 875-foot level is completed.

The Trail Smelter has got its lead smelter in blast. They have secured ores from Slocan and East Kootenay. Lead smelting will no doubt be found profitable from now on as the removal of the duty on pig lead refined in the United States from lead bullion will enable them to work at a profit. Formerly pig lead paid an import duty into Canada of 15 per cent, which had a tendency of shutting the product of Canadian mines out of that country. This has now been changed so that lead bullion produced at Canadian smelters can be sent to the United States in bond, refined in bond, and the pig lead produced is then reimported into Canada free of duty.

THOMAS & NEWCOMB.

Miscellaneous Mining News.

CALIFORNIA.

CALAVERAS COUNTY.

Eighty stamps are dropping at the Gwin Mine. There are about 170 men on the payroll.

The work of sinking at the Voorlander has been stopped, and preparations are now being made to crosscut the lead.

Some very rich rock was struck in drifting north on the 300-foot level of the Commodore Mine, situated one mile west of San Andreas. The rock will go between \$5 and \$6 to the ton. There are already twelve feet of this rock, but the full width of the vein has not yet been determined. Twelve men are employed at the mine, work is going ahead in an active and systematic manner.

EL DORADO COUNTY.

A strike was made at the Schneider Mine, adjoining the Griffith and Coleman, near El Dorado. Seymour Hill and C. F. Bryant have a bond on it. A tunnel was run 750 feet east and crosscut. Recently a drift was made forty feet in on the three-foot vein, showing free gold.

Supt. Edward Bind of the Blue Gouge Mine reports improvements at the mine progressing very satisfactorily. The framework of the mill proper is up and enclosed and the machinery is all on the ground. Mr. Bind hopes to have the mill running inside of two months.

KERN COUNTY.

Coalinga Oil Fields.

Three cars of casing for the R. H. Herron Co. are being unloaded at the Valley depot. There is no abatement in oil exploitation.

Judging from the present outlook, within 60 days 100 drilling rigs will be in operation in the Kern River and McKittrick Districts.

A large quantity of oil-well material is lying at the station under consignment to the Bachelor Oil Company. Among the various machines are two gasoline engines.

Ott & Stevenson have added another drilling rig to their field equipment. They have had one in operation for some time.

The Bryant well is down about 700 feet, and should be very near the oil stratum.

Practical oil men express the opinion that within ninety days the extent of the Bakersfield territory will have been defined.

TUOLUMNE COUNTY.

The mill on the Arbon has started up. The force in the mine will be increased.

Work on the north extension of the Mt. Jefferson has commenced. A shaft will be sunk 500 feet, or until striking the vein.

The forty stamps at the Rawhide Mine are dropping regularly. The work of sinking the shaft was discontinued upon reaching the 1700-foot level. Sixty-five employees constitute the present working force.

The Progressive Development Company has incorporated with a capital stock of \$100,000, divided into 200,000 shares. The company owns the Ida Dell Mine, situated between Carters and Confidence.

COLORADO.

What gives indication of being the richest and largest ore chute ever demonstrated in Cripple Creek exists in the Mary McKinney Mine, a bonanza shipper for the past year, but it has now developed that a tremendously rich ore chute, 200 feet in length at the present time, and running from \$1,000 to \$3,000 a ton, has been opened in the 400-foot level of the property.

There is a report current to the effect that an Eastern syndicate has secured an option upon the control of the Portland Company stock. The report is of eastern origin and little of the details are known in the west. It is stated in connection with the report that the syndicate has money sufficient to purchase the Portland several times over. The Portland, it is stated, is held today at \$5 a share, which price it is believed would not be paid by any Eastern mining concern, no matter how good the mine is. Five dollars a share would make the property sell for \$15,000,000, which is the figure at which Mr. Burns has held the mine for some time.

The annual meeting of the stockholders of the Isabella Gold Mining Company was recently held, and, as was foreshadowed, President B. Williams controlled the meeting overwhelmingly, and the regime which obtained last year will be continued. The mine produced during the last year:

Total gross production of ore.....	\$968,011.24
Net smelter returns.....	851,476.32
Net profits of the company after deducting all mining expenses and machinery changes, etc....	546,818.38
Cash balance in banks to credit of company, Dec. 31, 1899.....	476,796.06
Amount paid in dividends during year.....	270,000.00

MICHIGAN.

The Franklin mine, near Hancock, is out of debt, and has 10,000 shares of stock in the treasury that has never been issued. The mine is producing nearly 200 tons of

mineral a month. When the third head starts up, the mine will produce over 200 tons of refined copper a month. The old mine is furnishing about one third of the rock that is being stamped. Lately they have been getting it from the old stopes and levels and not from the body of rock which was to give the Franklin its life. At the fourteenth level in this mine, a 300-foot crosscut has been started over to the Allouez conglomerate. In the old days this conglomerate was exceedingly rich, and it is hoped to find it as rich at greater depth as in shallow workings.

NEVADA.

Charles Colton and Joe Lee have struck pay copper, silver and gold ore on the Copper Butte claim, one of eight claims located about four miles from the Colorado River, toward Searchlight. The ore assays \$15.25 in copper, \$4 to \$5 in gold, and 15 to 25 ounces of silver. Some of the best of the ore will go \$56.50 in copper.

FOREIGN MINING NEWS

BRITISH COLUMBIA.

The ore shipped over the Kaslo & Slocan Railway for the year 1899 was \$25,700,224 pounds, which shows a decrease of 16,902 891 from that of 1898.

Below is given the number of pounds shipped through Kaslo from each of the mines:

MINE.	POUNDS.
Payne.....	7,985,000
Last Chance.....	4,665,000
Whitewater.....	3,842,324
Lucky Jim.....	3,491,400
Jackson.....	1,689,900
Rambler.....	1,431,800
Slocan Star.....	769,000
Reco.....	450,000
Dardanelles.....	186,000
Native Silver Bell.....	167,000
Ivanhoe.....	158,000
Trade Dollar.....	104,000
Great Western.....	100,000
Wonderful.....	81,000
Noble Five.....	80,000
Treasure Vault.....	69,000
Antoine.....	48,060
American Boy.....	41,000
Sovereign.....	40,000
Florida.....	40,000
Sapphire.....	36,000
Gibson.....	32,000
Snap.....	32,000
Red Fox.....	30,000
Grant, Woodbury.....	30,000
Liberty Hill.....	30,000
Wellington.....	30,000
Bell Mines.....	30,000
Coin.....	12,590
Silver Bell, South Fork.....	6,000
Texas.....	1,000
Fletcher Mine.....	350

Total25,700,224

MEXICO.

Announcement is made of the sale of the Sonora Mine of El Oro to the Exploration Syndicate of London. Charles D. Lane had an option on the property for \$250,000, and it is said that he sold it to the syndicate for \$1,500,000.

The conducta from the Sierras brought in to Chihuahua 62 bars of bullion. The mines from which the bullion came, the number of bars and their value were as follows:

Owner or Mine.	Bars.	Value.
El Refugio.....	11	\$ 30,000
Sta Eduwigis.....	12	20,000
Miguel Prado.....	1	1,000
J. N. Saldwar.....	1	1,000
Dionico Marquez.....	1	1,000
Ig Rodriguez.....	1	500
Ig Rodriguez.....	2	1,000
B. I. Siquiros.....	1	1,000
M. R. Vidol.....	1	1,000
B. A. Juarez.....	2	1,200
Pinos Altos.....	11	25,000
J. F. Valenzuela.....	2	1,000
El Socorro.....	3	15,000
Sahuaycan.....	1	7,000
Jesus Solis.....	2	2,000
B. F. Brown.....	1	1,000
J. G. Watterson.....	5	15,000
El Canchenyo.....	1	16,000
Total Value.....		\$143,000

BOOK REVIEWS

"Power Transmission by Electricity," by Philip Atkinson, A. M., Ph. D., D. Van Nostrand Company, New York City.

A second, fully revised and enlarged edition of this well-known work will be welcomed by students, teachers and general readers. The business of transmitting and applying electrical power has developed rapidly in recent years, and many of the earlier machines and methods have now been superseded. Dr. Atkinson's book covers these improved devices and processes, and presents the subject as it is today. Further improvements in minor details will doubtless continue to be made, but most of the standard types of apparatus have now been so far perfected that radical departures from them seem unlikely.

While not professing to treat the subject exhaustively, Dr. Atkinson provides students and lay readers with all the facts essential to an understanding of stationary motors, railway motors, central station construction and equipment, and other common forms of electrical power. The subject is treated lucidly and entertainingly, and the book in its new form will continue to be a standard work of its class.

Latest Mining Decisions.

Prepared for THE MINING AND METALLURGICAL JOURNAL, by Andrews & Murdoch, Berrien Springs, Michigan. Credit must be given when reprinted.

A suit brought under Rev. St. § 2326, to determine a contest between mining claims is of an equitable nature. *McFadden vs. Mountain View Min. & Mill. Co.*, 97 Fed. Rep. (U. S.) 670.

There can be no valid location of petroleum lands, under the mineral laws relating to placer claims, without a prior valid discovery of mineral within the limits of the claim. *Nevada Sierra Oil Co. vs. Miller et al.*, 97 Fed. Rep. (U. S.) 681.

A Federal Court has jurisdiction of a suit brought under Rev. St. § 2326, to determine a contest between mining claims, where the alleged value of the property meets the statutory requirements. *McFadden vs. Mountain View Min. & Mill. Co.*, 97 Fed. Rep. (U. S.) 670.

A trespass upon a mining claim does not raise a Federal question, nor does a claim of

right based upon a mere location of a mining claim, as against a patent regularly issued by the land department, under authority of law, for the land covered by such location. *Peabody Gold Min. Co. vs. Gold Hill Min. Co.*, 97 Fed. Rep. (U. S.) 657.

A patent for a lode mining claim, issued under the act of May 10, 1872, is not restricted to the surface ground which may be taken under a single location, and the fact that a patent includes ground extending more than 300 feet on either side of the lode or vein does not render it invalid on its face as to the excess. *Peabody Gold Min. Co. vs. Gold Hill Min. Co.*, 97 Fed. Rep. (U. S.) 657.

Code Civ. Proc., 1895, § 494 (Comp. St. 1887, div. 1, § 40) providing that no action for the recovery of mining claims, lode claims excepted, or for the recovery of possession thereof, shall be maintained, unless it appears that the plaintiff or his assigns was seized or possessed of such mining claim within one year before the commencement of such action, is not applicable to real estate patented as placer ground, and hence adverse possession of such land for one year after the issuance of the patent is not sufficient to divest the owner of title. *Horst vs. Shea et al.*, 59 Pac. Rep. (Mont.) 564.

A bill asserting rights based on the location of a mining claim under the laws of the United States, which shows that the validity of such location depends on the question whether or not the locators discovered a mineral deposit within the limits of the claim prior to its location, within the meaning of such laws, and which sets out in full the facts relating to such alleged discovery, discloses a question arising under the laws of the United States, which gives a Federal court jurisdiction where the requisite statutory account is involved. *Nevada Sierra Oil Co. vs. Miller et al.*, 97 Fed. Rep. (U. S.) 681.

Where the allegations of a bill show that the respective parties to the suit are making adverse claims to the same land under the mineral land laws of the United States, and that the proper determination of such conflicting claims necessarily requires the application and construction of those laws, a Federal Court has jurisdiction of the suit for such purposes, the property in controversy being alleged to be of the requisite statutory value; and having jurisdiction for that purpose, and such suit being equitable in its nature, the court will entertain and determine all incidental questions between the parties growing out of their conflicting claims, and will grant an injunction or appoint a receiver, where such course is proper. *Nevada Sierra Oil Co. vs. Miller et al.*, 97 Fed. Rep. (U. S.) 681.

Act July 1, 1892 (27 Stat. 62), restoring to the public domain a portion of the Colville Indian reservation in the State of Washington, and providing that, subject to the right of individual allotments therefrom to Indians as described therein, the same should be open to settlement and entry by the proclamation of the President, and should be disposed of under the general laws, did not operate of itself, in advance of the proclamation of the President, to give a right to locate mining claims therein under the mineral laws, a contrary construction having been placed upon it by the land department, and also, in effect, by Congress, by the passage subsequently of Act Feb. 20, 1896, in terms extending the mineral land laws so as to apply to the lands described in the prior act. *McFadden vs. Mountain View Min. & Mill. Co.*, 97 Fed. Rep. (U. S.) 670.

The new Empire Building, Pittsburg, Pa., will contain two Scaife water filters, having a combined capacity of 3500 gallons per hour. The arrangement contains a unique feature, being designed so that either filter can be shut off from the main supply pipe while being cleansed; the other filter meanwhile furnishing the filtered water for the entire building. Wm. B. Scaife & Sons, of the same city, are the manufacturers of these filters, which contain no chemical or coagulant of any description.

The contract for the large extensions to the plant of the Carbon Steel Company was awarded to Wm. B. Scaife & Sons, Pittsburg, Pa. The specifications call for a great amount of plate girder work and steel frame construction.

PERSONAL NEWS ITEMS.

CHARLES SHERMAN has been appointed assayer of the U. S. Mint at San Francisco by President McKinley.

J. K. MACKENZIE, mining engineer of Chicago, has gone to Montana, where he will examine mining property for Chicago people.

JOHN MACGINNIS, general manager of the Montana Ore Purchasing Company, was in Butte, Mont., two or three days ago.

LUIS MONTGOMERY, the mining man from San Jose, is operating at present in the Slate Range, San Bernardino County, Cal.

The Board of Regents, Nevada State University, has accepted the resignation of R. D. JACKSON, who occupied the chair of mines.

A. PAYNTON has been appointed Commissioner of Crown Lands and Minister for Mines in the new South Australian ministry.

GENERAL C. S. WARREN was in Rossland, B. C., last week, looking over some mining property which he will become interested in shortly.

BENEDICT CROWELL, of the firm of Crowell & Peck, Cleveland, has recently been in Salt Lake City, examining mining properties in various camps near that city.

PROF. WM. P. BLAKE, director of the Arizona School of Mines, was appointed agent U. S. Mint for the collection of statistics of the precious metal production in Arizona.

DR. FR. KOLBECK, professor at the Freiberg Mining School, took editorial charge of the metallurgical department of the *Berg- und Huettenmaennische Zeitung* on January 1st, succeeding Dr. C. SCHNABED, of Clausthal, who retires.

CAMPION & HENNESSY have just received a new stamp mill which they are putting up at the water right near their mine, between Garlock and Kane Springs, Kern County, Cal. It is said they have several hundred tons of rich ore on the dump.

JOHN IRWIN, Superintendent of the Union Oil Company's Oil Works at Santa Paula, has been visiting the Desert for some days, examining the coal and oil prospects. He fails to find any signs of oil east of the Mojave region, but is well pleased with the coal at Black Mountain, Kern County, Cal.

HOMER MORRIS of Los Angeles, who is an oil expert of considerable experience, and who has spent a month or more looking over the region of Black Mountain and Jawbone Canon for signs of oil, reports that there is probably no oil west of the Sierra Nevada.

LEW E. AUBURY, the mining engineer of Los Angeles, has recently returned from a trip to Northern Arizona—Chloride and other points. Mr. Aubury is prominently connected with the Industrial, Mining and Citrus Exposition to be held in Los Angeles, and is also one of the committee men for Southern California of the California Miners' Association.

MR. THEO. F. VAN WAGENEN, E. M., of Denver, Colorado, was in Southwestern Oregon during December, examining some hydraulic mines in the vicinity of Grant's Pass. During January he has been engaged in inspecting several of the water powers of the Snake River, Idaho, for parties who contemplate installing one or more electric power plants. He will probably make his headquarters this year at Boise, Idaho.

The Mining And Metallurgical Journal

THE MARKETS.

All quotations, financial reports and other statistical figures given under this head are New York Quotations, unless otherwise stated in each item. These figures are carefully revised each issue, and constitute a very accurate compilation of statistical matter.

METALS.

The following are the Silver, Copper and Lead quotations for the last two weeks:

	SILVER.	COPPER.	LEAD
Jan. 1	58 1/2	16 50	4 75
" 2	59	16 50	4 70
" 3	59	16 50	4 70
" 4	59 1/2	16 50	4 70
" 5	59 1/2	16 50	4 70
" 6	59	16 50	4 70
" 7	59	16 50	4 70
" 8	59	16 50	4 70
" 9	59	16 50	4 70
" 10	58 1/2	16 50	4 75
" 11	58 1/2	16 50	4 75
" 12	58 1/2	16 50	4 75
" 31	58 1/2	16 50	4 70
" 41	58 1/2	16 50	4 70

SILVER

The Silver market has been steady and dull showing only small fractional changes during the week and closing at 26 1/2 d. in London.

COPPER.

Prices remain unchanged from those quoted last week. Lake copper 18 1/2c, Electrolytic in cakes, wirebars and Ingots 17 @ 17 1/2, Cathode 16 1/2 @ 16 3/4c, casting copper 17 nominal. The foreign market is still dominated by difficulties betw. England and Transvaal. London

is quoted, English tough £78, 15s @ £79 5s, best selected £80 5s @ £80 15s, India sheets £83 @ £83 10s.

LEAD.

Lead continues in good demand and with no change in prices. New York being quoted at 4.55 @ 4.60c.

The foreign market has been irregular but the tendency is upwards. Spot is quoted at £15 17s 6d @ £16 2s 6d for Spanish and £16 5s @ £16 7s 6d for English, while futures are at a discount of 5s to 10s.

SPELTER.

The disquieting news from the ore-fields stirred up consumers and a good business has resulted at stiffening prices. New York is quoted at 5.45 @ 5.50.

The foreign market is also firmer and again higher good ordinaries being quoted at £22 12 6d, Specials £22 17s 6d.

ANTIMONY.

Antimony is in good demand. We quote Cooksons at 10 1/2 @ 11c, Hallett's at 9 1/4 @ 9 1/2, U. S. Star and Hungarian 7 1/2 @ 9 1/2c.

NICKEL.

Nickel continues unchanged and no alternation of prices can be reported. We quote for ton lots 33 @ 36c per lb., and for smaller orders 35 1/2 @ 38c. London prices are 14 @ 16d. per lb., according to size of order.

TIN.

It is quite natural that this article, which is always volatile should suffer in consequence of the unsettled state of affairs abroad and the higher money market. Fluctuations have been rather wide but the close is again firm at £145 15s for spot and £146 2s 6d for three months.

In New York the buying was restricted

to quantities needed to cover immediate requirements although consumption continues at a fair rate. We quote Straits in carload lots at 32 1/2c f. o. b. New York.

PLATINUM.

The demand for Platinum is good and prices are firmer. New York is quoted \$17.75 per ounce for large lots and \$18 for smaller orders.

POTASSIUM CYANIDE.

Purified, 98 @ 99 per cent., in cases of 120 lb. at 30c. per lb. in 5, 10, 25 and 50 lb tins at an advance.

QUICKSILVER.

The wholesale price in New York has advanced \$1 and is now \$48.00 per flask. The London price has risen to £8 17s 6d per flask, with the same rate from second hands.

THE MINOR METALS.

Quotations are given below for New York delivery:

Aluminum:	
No. 1, 99 per cent. Ingots, per lb.	35 @ 37c
No. 2, 90 " " "	31 @ 34c
Rolled sheets, per lb.	38c. up
Aluminum-Nickel, per lb.	33 @ 39c
Alum-bronze	20 @ 25c
Bismuth, per lb.	14 @ 15c
Phosphorus, per lb.	4 @ 5c
Magnesium	27 1/2 @ 3.00
Tungsten, per lb.	70c
Ferro-tungsten, 60 per cent.	60c

Variations in price depend chiefly on the size of the order.

ACIDS.

Acetic is in good request, muriatic is moving briskly on contract, and sulphuric is unchanged. Blue vitriol is quiet. Only 50 bbls. oxalic acid were imported this week.

The exports from the United States in August amounted to \$12,653.

BRIMSTONE.

There are no arrivals. Spot best un-mixed second \$22 @ \$22.50 per ton and shipments \$21.15; thirds, \$19. The imports of brimstone into the United States in August were 11,109 tons.

NITRATE OF SODA.

Demand is very quiet and quotations for all positions are nominally \$1.65 per 100 lbs. Odd lots can doubtless be had at \$1.62 1/2. The United States imported 18,708 tons nitrate of soda in August.

CHEMICALS.

Most of the business done in heavy chemicals is for future delivery, the little doing on spot being at advanced prices. Imports this week included 200 drums, 210 casks and 2 bbls. bleaching powder. Importers expect a curtailment of shipments from England when the Boer war is on, as the merchant vessels will be used for transporting troops to South Africa. Receipts of domestic goods at New York last week included 1055 sacks alkali and 250 drums caustic soda.

Caustic-soda high test is quoted per 100 lbs. f.o.b. works at 1.77 1/2 @ 1.82 1/2; in New York, \$1.85 @ \$1.90. Bi-carbonate of soda is quoted per 100 lbs. f.o.b. works, \$1.12 1/2 @ \$1.25. Chlorate of potash crystals in New York are quoted for domestic, \$8.75 @ \$9.00; foreign, \$9.25 @ \$9.37 1/2; powdered domestic at \$9.25 @ \$9.50, and foreign, 9.50 @ 9.75.

CHLORIDE OF LIME.

English prime brands are quoted at 1.65 @ 1.75 with 1.50 @ 1.60 for other brands.

CLING-SURFACE

In Your
Belts will
ADD
At Least
15%
to their
Power.

WE KNOW this is true for the simple reason that we have about 200,000 Belts throughout the world doing this every day, because they have Stopped Slipping and are running easy, with increased contact of belt on pulley—which means power. CLING-SURFACE keeps a belt soft and pliable, preserves it and makes it absolutely **Waterproof**. Rubber belts will also stop slipping and run slack. We guarantee the above.

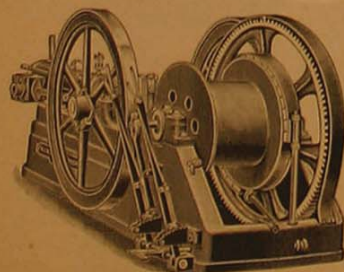
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First Quality in all Lines

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Our Compined Geared Gasoline Engine and Hoist, and Combined Gasoline Engine and Air Compressor Especially adapted for Mining Purposes.

Fairbanks' Standard Scales, Mining Cars, Spiral Riveted Pipe, Car Wheels, Pipe and Fittings.

Fairbanks, Morse & Co.,

Chicago, Cleveland, Cincinnati, Louisville, Indianapolis, St. Paul, Minneapolis, St. Louis, Kansas City, Omaha, Denver, San Francisco, Los Angeles, Portland, Oregon.

FINANCIAL NOTES.

AVERAGE PRICES OF METALS.

In New York per 100 lbs. from January 1st, 1899:

Month	Copper	Tin	Lead	Spelter
January.....	14.75	22.48	4.18	5.34
February.....	18.50	24.30	4.49	6.31
March.....	17.54	23.82	4.37	6.31
April.....	18.03	24.98	4.31	6.07
May.....	18.25	25.76	4.44	6.88
June.....	17.93	25.85	4.42½	5.89
July.....	18.33	29.63	4.52	5.89
August.....	18.50	31.53	4.57	5.89
September.....	18.46	32.74	4.59	5.50
October.....				
November.....				
December.....				

AVERAGE MONTHLY PRICES OF SILVER.

In New York per ounce Troy, from January 1st, 1899, and for the years 1898 and 1897:

Month	1899	1898	1897
	Cents.	Cents.	Cents.
January.....	59.36	56.77	64.79
February.....	59.42	56.07	64.67
March.....	59.64	54.90	63.06
April.....	60.10	56.02	61.85
May.....	61.23	56.98	60.42
June.....	60.43	58.01	60.10
July.....	60.26	59.06	59.61
August.....	60.00	59.54	54.19
September.....	58.89	60.68	55.24
October.....		60.42	57.37
November.....		60.60	57.91
December.....		59.42	58.01
Year.....		58.26	59.79

MONEY IN CIRCULATION.

Comparative statement of the circulation in the United States on Oct. 1st 1899. Comparison being made with statement on September 1st, 1899.

	October 1, 1899	Changes
Gold.....	\$46,361,185 D.	\$26,379,997
Silver.....	142,801,025 L.	\$3,396,932
Legal Tenders.....	314,954,600 L.	4,824,179
Treas'y & N' B' Notes.....	329,688,956 D.	483,165
Totals.....	\$1,434,014,746 D.	\$16,934,061

Gold and Silver certificates and currency are not included in this table. By adding the amounts given in this table

with those in the following will give the total amount coined or issued. The figures herewith are furnished by the Bureau of Statistics Treasury Department.

MONEY IN TREASURY.

Comparative statement of changes of money in United States Treasury on Oct. 1st 1899, comparison being made with statement, on Sept. 1st, 1899.

	October 1, 1899	Changes
Gold.....	\$122,271,989 L.	\$31,285,225
Silver.....	415,844,704 D.	4,659,483
Legal Tenders.....	317,756,416 L.	4,824,179
Treas'y & N' B' Notes.....	4,850,547 L.	352,491
Totals.....	\$673,693,656 L.	\$32,163,057

The Gold and Silver bullion on hand in the Treasury is not included in this statement.

GOLD AND SILVER EXPORTS AND IMPORTS.

At all United States ports, for the month of September, 1899, and 9 months ending September, 1898, and 1899:

	SEPTEMBER, 1899	1898
Gold—		
Exports.....	\$3,102,810	\$ 618,995
Imports.....	16,808,341	2,593,894
Excess.....	\$13,705,531	\$ 1,974,899
Silver—		
Exports.....	\$5,153,103	\$3,622,041
Imports.....	2,000,696	2,375,846
Excess.....	\$3,152,407	\$ 1,246,195

NINE MONTHS ENDING AUGUST.

	1898	1899
Gold—		
Exports.....	\$12,281,923	\$32,877,838
Imports.....	127,343,816	34,268,421
Excess.....	\$115,061,893	\$ 1,390,583
Silver—		
Exports.....	\$39,433,500	\$38,738,431
Imports.....	21,099,224	22,724,095
Excess.....	\$18,334,276	\$ 16,014,336

This statement includes the exports and imports at all United States ports, the figures being furnished by the Bureau of Statistics of the Treasury Department.

The Cleveland Mining and Stock Exchange Co.

New England Building, Cleveland, Ohio.

A Reliable Information Bureau for Miners and Investors to obtain FACTS Regarding Capital and Mines. Stocks and Mines listed. Send for prospectus.

Morgan-Watson Mining and Construction Co.

800-810 New England Building, Cleveland, Ohio

MINES AND STOCKS } We Buy, Sell, Lease and Bond Mines of all kinds
We Buy, Sell, and Negotiate sales of mining and other stocks.
We Furnish machinery to work gold mines under special arrangement.
We Furnish Capital to develop mines.

JAMES IRVING & CO.

REFINERS

ASSAYERS

Largest and most complete establishment in Southern California Cyanide and Mill Test.

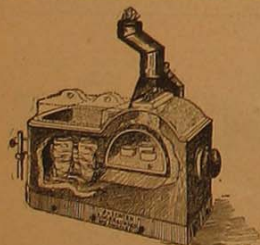


Mint Prices paid for Gold and Silver Bullion. Returns made within four hours after receipt.

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Los Angeles, Cal.



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Combination Melting and Muffle

Assayers' Furnaces

(For Gasoline)

Are Economical, Convenient and Efficient.
DESCRIPTIVE CATALOGUE ON APPLICATION.

F. W. BRAUN & Co.,

Assayers Supplies of Every Description.

501-505 N. MAIN STREET
LOS ANGELES, CAL.

This illustration shows L & C Combination Furnace, melting and cupelling simultaneously with one burner.

RIVETED SHEET STEEL WATER PIPE
For Placers, Water Powers, Irrigation, Etc.
THE WEIGLE PIPE WORKS
2949-51 Larimer St. DENVER, COLO.

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Other than above \$1.00 per month.
Advertisements not accepted for less than one month.

COPPER MINE. State full particulars in regard to development work location, distance from water, price of fuel, character of ore and returns from shipments. Must have at least 1500 feet of development work. Send all information possible. Address,

JAMES HOWARD,
Care The Mining and Metallurgical Journal,
32 Broadway, New York, N. Y.

GOLD mine anywhere in *United States*, must have at least 1000 feet of *development*; where coal is *not over \$6.00 per ton* or wood \$4.00 per cord *delivered*; plenty of *water*; no *objection to low grade* ore if profit can be made by having *large plant to amalgamate and concentrate*; want 6 months working *bond*; no *property* considered unless *owners* are prepared to deposit *certified check* for expenses of *engineer* if *property* is *not as represented* Address with *price and full particulars*

J. E. M., Mining and Metallurgical Journal,
32 Broadway, New York, N. Y.

EXPERIENCED man desires position, who can install, run and keep in repair, Steam, Electrical and Mining machinery, has knowledge of assaying and office work. References. Address: W. H. K., McCLOUD, CAL.

PRACTICAL young assayer desires position as assistant assayer or helper around mill. Best of reference if desired. Address, ALBERT GUY, Y. M. C. A., 209 S. B'way, Los Angeles, Cal.

Gold, Silver, Copper, Zinc and Lead Mines.

Partner wanted who would invest \$20,000 in developing a large Mining property located in the Territory of Tepic, Mexico, on the Pacific Coast. Gold mines ore averages from 3 to 30 oz. per ton of 2000 lb., Silver from 1 to 38 kilo, Lead from 15 to 30 per cent., Zinc from 20 to 25 per cent., Copper from 5 to 25 per cent. Reports, Maps and Samples sent on application. Waterfalls 500 H. P. and sufficient timber close to the mines. Call or address, ELIAS GALINDO, 94 Iturbide St., Tepic, Mexico.

NOTICE TO STEAM USERS.

The National Association of Stationary Engineers is prepared to furnish Engineers of guaranteed ability for any plant in the city or elsewhere. Give us a call. Address: J. T. CHAMBERS, Sec'y, Engine Room City Hall, Tel. Main 557. Los Angeles, Cal.

WANTED a second-hand White Howell Roaster, also a Revolving Dryer. Must be in good repair. Address, ARTHUR HENDEY, Agent Copper Chief Mining Co., Jerome, Ariz.

FOR SALE

WILL GIVE one-half interest in a group of five gold claims on the desert for parties who will put up mill and Cyanide plant. Address, "J. G. B." Journal Office, Los Angeles, Cal.

A LARGE Gold deposit, will average \$15.00 free gold suitable for Cyanide Process. Twelve miles from Railroad, in Arizona. Terms reasonable.

H. P. DUBRELL,
El Paso, Texas.

REMAIN Two Stamp Steam Mill at Tucson, Arizona. 15-H. P. Boiler Pump and every thing complete, set up ready for work. In excellent condition, used less than six months. Address DREDGING MACHINERY CO. Kansas City, Mo.

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85,000 feet Wire Rope, all sizes, for Hoisting and Guy use; 200 Army Tents; plain Slings; Manila Rope; Iron Blocks; Iron Shackles. These goods have only been used a few days. Can be bought cheap. Address, EDWARD J. KANE, 260 Front St., New York City.

CHEMIST, 5 years training and knowledge of Mineralogy, desires position with prospecting party or as assistant in laboratory. Highest endorsements. Address, J. W. FELL, Ashville, N. C.

FAKE CAPE NORE

TRANSPORTATION or Mining Companies and Information Bureaus are always exposed in "INDUSTRY & MINING." It is the official paper of the Alaska Miners' Association—better take it for three months and keep posted on the Mining Industry of the Northwest. Only 50 cents. W. J. HOMER, Publisher, 18 Colman Building, Seattle, Wash.

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A 60-TON copper smelting Plant, consisting of two 30 ton furnaces, one of which has new seamless liner. Plant is complete in every detail. Also an 80-ton Silver-Lead Furnace, entirely new, never having been set up. All of the above located immediately adjacent to railroad. Enquire of GARDNER, WORTHEN & Goss, dealers in Mining and Mill Supplies, Tucson, A. T.

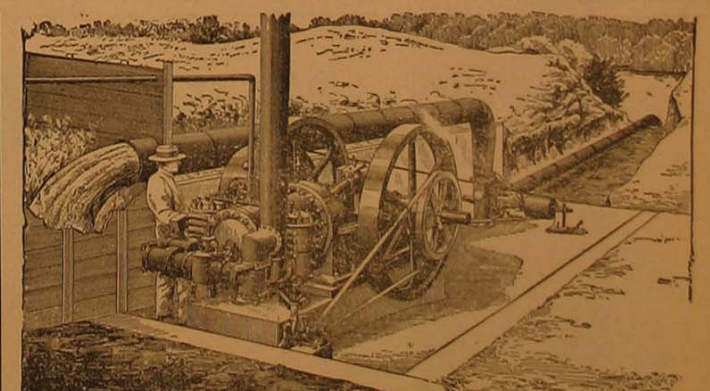
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MINING STOCK QUOTATIONS

BOSTON

Adventure	7 00	Mass	9 50
Aetna	3 50	Mohawk	10 00
Allouez	3 50	Napa	15 00
Anaconda	37 50	Old Colony Con	5 00
Arcadian	25 00	Old Dominion	25 00
Arnold	5 75	Oscoda	57 50
Atlantic	25 00	Parrott	36 50
Baltic	17 50	Pioneer	40 00
Bingham	10 00	Quincy	40 00
Ronanza	—	Rhode Island	5 00
Boston & Mont	25 00	Santa Fe	5 00
Breece	—	Santa Isabel	7 00
Butte & Boston	45 00	Tamarack	170 00
Calmnet & Hecla	72 00	Tecumseh	3 75
Catalpa	—	Tri-Mountain	6 38
Centennial	15 50	Victor	3 00
Cochiti	11 50	United States	26 50
Copper Range	29 00	Washington Ming	1 13
Crescent	42 00	White Knob	—
Dominion Pref	13 25	Winona	5 50
Franklin	—	Wolverine	37 00
Gold Dredging	—	Wyandotte	2 00
Humboldt	—	—	—
Isle Royale	22 75	—	—
McInnes	1 50	—	—

ROSSLAND, BRITISH COLUMBIA

Brand'n & G'd Crk	29	Kootenay Gold F.	—
Brit. Amer. Con	—	Lerwick	—
Brit. Col. Dev. Co	—	Lily May	10
Canad. G'd Fields	07 1/2	Lon & Van M. D. Co	—
Cariboo	1 16 1/2	London R. C. G. F.	7 00
Commander	—	Monte Cristo	05 1/2
Deer Park	04 1/2	New G'd Fields B. C.	50
Dundee	15	Novelty	15
Evening Star	09	Queen Bess Prop.	5 50
Fern	28	Rambler-Cariboo	56
Gold Fields of B.C.	—	Red Mount. View	—
Hattie Brown	—	Reco	—
Hill Mines	—	Silver Bell	—
Homestake	—	Silver Queen	—
Iron Horse	06	St. Elmo	05 1/2
Iron Mask	76	Slocan Star	1 10
Josie	—	Vic. Tr. M. Dev. Co.	—
Jumbo	25	Waverly Mines	—
Kenneth	—	Wag Eagle Con.	2 75
Keystone	—	White Bear	—

SAN FRANCISCO

Alta	04	Mexican	30
Andes	10	Occidental	20
Belcher	33	Ophir	87
Best & Belcher	36	Overman	19
Bullion	04	Ontario	—
Caledonia	70	Plymouth	58
Challenge	30	Potosi	58
Chollar	31	Quicksilver	—
Confidence	80	Quicksilver pref'd	25
Con. Cal. & Va.	1 65	Savage	03
Crown Point	15	Seg. Belcher	62
Deadwood	—	Sierra Nevada	—

Gould & Curry	35	Silver Hill	—
Hale & Norcross	37	Standard	3 05
Homestake	—	Union Con	12
Iron Silver	—	Utah	28
Justice	08	Yellow Jacket	—

COLORADO SPRINGS STOCKS

Acacia	28 1/2	Hayden	02
Alamo	08 1/2	Ingham Con	10
Altamont	—	Isabella	9 1/2
American Con	—	Jack Pot	85
Anaconda	41 1/2	Kimberly	13
Aols	04 1/2	Lexington	21 1/2
Arcadia Cons	04 1/2	Magnet Rock	05 1/2
Argentum Juniata	25 1/2	Matia	32 1/2
Bankers	05 1/2	Montreal	15 1/2
Banner	04 1/2	Mountain Beauty	09 1/2
Bob Lee	08 1/2	Mollie Gibson	27 1/2
Creede & C. Co.	13	Moon Anchor	74 1/2
Cripple Crk Con	15 1/2	Mount Rosa	39 1/2
Dante	18 1/2	New Haven	03 1/2
Des Moines	05 1/2	Oro	08 1/2
Elkton	1 17	Orphan	08 1/2
Franklin	41 1/2	Pharmacist	08 1/2
Emma Aimee	02 1/2	Pilgrim	07
Fanny B.	04 1/2	Portland	2 45
Favorite	05	Pr. Albert	04 1/2
Findley	17	Rattler	07 1/2
F.P. of the W. St	04 1/2	Specimen	08 1/2
Golden Fleece	26	Theresa	19 1/2
Gold & Globe	05	Trachyte	07 1/2
Gold King	94	Union	32 1/2
Gould	30 1/2	Vindicator	1 42
Granite Hill	03 1/2	Work	32 1/2

SALT LAKE CITY

Anchor	50	Joe Bowers Ex.	05
Ajax	98	La Reine	60
Alliance	40	Lower Mammoth	28
Alice	40	Little Pittsburg	03 1/2
Bullion Beck	3 85	Mammoth	3 48 1/2
Buckeye	—	Mercur	6 93
Cent. Kureka	68 00	May Day	61
Chloride Point	25	Northern Light	14 1/2
Congor	25	North Swansea	13
Daly	1 41	Omaha	8 20
Daly West	12 73	Ontario	8 20
Dalton & Lark	03	Petro	29
Dalton	01	Rich. Anaconda	29
Dexter	2 45	Sunshine	30
Daisy	18 1/2	Swansea	3 92 1/2
Eagle	03 1/2	So Swansea	1 35
Eagle & Blue Bell	1 45	Sunbeam	67 1/2
Emerald	12	Sacramento	46
Four Aces	13 1/2	Silver King	45 00
Geyser-Marion	34	Star Consolidated	43
Galena	30	Showers Con	60
Grand Central	5 50	Tetro	05
Golden Eagle	04 1/2	Utah	05
Horn Silver	1 17 1/2	Valeo	85
Homestake	04 1/2	West M't'n P'cer	11
Ingot	09	Yankee Con	15 1/2
Joe Bowers	17	—	—

NEW YORK

Adams Con	12	Isabella	1 40
Alamo	14 1/2	Iron Silver	50
Alice	35	Jefferson	—
Alliance	—	Jennie Blanche	—
Anaconda Copper	38 00	Justine	—
Anaconda Gold	44	King & Pemb	35
Anchuria L.	72	Leadville Cons	08
Argentum Juniata	18	Little Chief	18
Belcher	12	Mexican	—
Best & Belcher	23	Mollie Gibson	24
Burt Gold	—	Mt. Rosa	45
Breece	1 75	Occidental	10
Brunswick	24	Ontario	7 75
Chollar	20	Ophir	—
Chrysolite	—	Pharmacist	08
Comstock Tunnel	04	Phoenix	75
Comstock Stocks	04	Plymouth	08
Comstock Script	05	Portland	2 28
Con. Cal. & Va.	1 45	Potosi	—
Cr. & Cr. Creek	08	Quicksilver	2 00
Crescent	12	Quicksilver pfd	7 50
Crown Point	14	Rocky Mountain	—
Cripple Creek Con	16	San Juan Star	—
Deadwood Terra	45	Savage	05
Elkton	1 85	Terra Nevada	30
Enterprise	—	Small Hope	—
Good Samaritan	—	Specimen	08
Gold Coin C. Crk	—	Standard Con	2 40
Gold Coin Gilpin	—	Syndicate	—
Golden Fleece	27 1/2	Union Con	20
Gould & Curry	20	Union	32 1/2
Gregory Gold	—	Utah Con	02 1/2
Hale & Norcross	30	Union Gold	—
High Five	—	Vindicator	—
Homestake	65 00	Work	28 1/2
Horn Silver	1 00	Yellow Jacket	20

SPOKANE, WASHINGTON

Ben Hur	15	Mountain Lion	1 08
Black Tail	14	Morrison	—
Butte and Boston	05 1/2	Number Six	—
Cariboo	—	Pearl	11
Deer Trail No. 2	22	Princess Maude	14 1/2
Golden Harvest	04	Quily	12
Insurgent	04	Rebate	19
Iron Monitor	—	Republic	—
Jim Blaine	31	San Poll	—
Liberty	—	Tom Thumb	17
L. Pine Surp. Con	23	Winipeg	—
Morning Glory	11 1/2	—	—

DENVER STOCK REPORT

Aetna	—	Keystone	11 1/2
Anchuria Leland	70	Lillie	—
Anaconda	44	Matia	32 1/2
Arcadia	04 1/2	Mollie Gibson	27 1/2
Argentum Juniata	25 1/2	Moon Anchor	73 1/2
Banner	04 1/2	Mt. Rosa	39 1/2

Bob Lee	08 1/2	Old Gold	—
Elkton	1 17	Peoples	—
El Paso	41 1/2	Pilgrim	07 1/2
Enterprise	17 1/2	Pine Creek	2 45
Fanny B.	00 45	Portland	—
Garfield	15 1/2	Prince Albert	04 1/2
Geo. Washington	—	Republic	04
Golden Eagle	—	Sacramento	08
Gold Coin	2 10	Smuggler	—
Gilpin & C. Co.	—	Specimen	13 1/2
Gilpin Four	—	Tamarack	—
Golden Fleece	26	Union	32 1/2
Isabella	01 1/2	Virginia M	08 1/2
Iron Clad	08 1/2	Wheels Cons	—
Jack Pot	85	Work	32 1/2

MEXICO

Name of Company	State	Price
Amistad y Concordia	Hidalgo	28
Agustina	Guanajuato	280
Arcvalo y Anexas	Hidalgo	200
Asturiana y Anexas	Zacatecas	180
Barradon y Cabras	Durango	40
Bartolome de Medina	Hidalgo	88
Cabelson y An	Zacatecas	15
Candelaria de Pinos	Hidalgo	180
Capuaya	Durango	30
Carmen	Hidalgo	400
Cinco Senores y An	Guanajuato	350
Concepcion y Anexas	S. Luis Potosi	200
Coronas	Mexico	75
El Oro	Guanajuato	30
El Oro, pref.	Guanajuato	30
Esparanza y An	Mexico	1,600
Florida	Chihuahua	50
Guadalupe	Guanajuato	235
Luz de Borda Aviado	Michoacan	30
Luz de Maravillas	Hidalgo	120
Pabellon	"	20
Palma de Somb.	Zacatecas	80
Pionles	Durango	2,200
Rafael y Anexes	Hidalgo	1,020
Real del Monte	Hidalgo	500
Restauradora	Durango	20
Rosario y Anexas	Durango	10
San Francisco	Hidalgo	195
San Rafael aviado	Hidalgo	410
San Rafael del Oro	Hidalgo	20
Sta. Maria de la Paz	S. Luis Potosi	240
Soledad	Hidalgo	330
Sorpesa	"	250
Trinidad Aviator	Guanajuato	50
Trinidad Aviado	Guanajuato	40
Tlaxingo	Puebla	30
Union Huelada	Hidalgo	25
Zona Min. de Paz	Guanajuato	350

Note—The above Mexican stocks are figured on the basis of Mexican silver

CLARENCE HERSEY,
Assayer and Chemist

(Established 1879)

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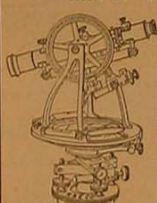
Samples by Mail or Express Re-
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SPECIMEN ASSAY PRICES:

Gold silver and lead, \$1.00; any two of the above, 75c; any one of above, 50c; copper assay as is; platinum, nickel or tin, \$5.00.
Write for full price list and mailing envelopes

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Maker and Repairer



of Transits, Levels and all other instruments used in mining. Fine assorted stock of Keuffel and Esser goods. Also Microscopes, Barometers, Field Glasses, Thermometers, Hydrometers, etc.

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Los Angeles, California

BULLOCK DIAMOND DRILLS

If you are interested in prospecting, send for our new Catalogue No. 33.

BULLOCK MINING MACHINERY

Hoists and Haulage Plants, Mine Ventilators, Cars, Skips, Gages.

Write for What You Want.

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FROM CRIPPLE CREEK

AIR COMPRESSORS
ROCK DRILLS,
Stone Channelers,
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Coal Cutters,

THE INGERSOLL-SERGEANT DRILL COMPANY, HAVEMEYER BUILD'G
PARKE & LACY CO., AGENTS, SAN FRANCISCO, CAL. NEW YORK

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New Catalogue No. 41

Pamphlet No. 100

Catalogue No. 72

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FRANK O. BECK, Sec'y and Treas.

THE PORTLAND GOLD MINING CO.,

(Stock Transfer Office, Colorado Springs.)

Mines at Victor, Colorado

The Ingersoll-Sergeant Drill Co.,

Gentlemen:—We bought two years ago one of the largest size of the straight line type of Ingersoll-Sergeant Piston Inlet Compressor.

This was found to be too small for our needs about a year ago and we purchased of you a Duplex Corliss machine 16" x 18" x 24".

This was set in place in our shaft house in the Cripple Creek District, 10,000 feet above the level of the sea, and has been running continuously ever since, and at times over in 3 1/2" Eclipse drills. The steam cylinders were connected to an independent Jet Condenser, for which we are using themine water, and the resultant economy of operation is very noticeable.

The operation of this Compressor is as near perfect as that of any machine we have ever seen, and this type is well worth the extra cost on account of the great permanent economy in operation.

Our mine is equipped exclusively with your drills and we have only the highest words of praise to give them.

Yours very truly,

The Portland Gold Mining Co.,

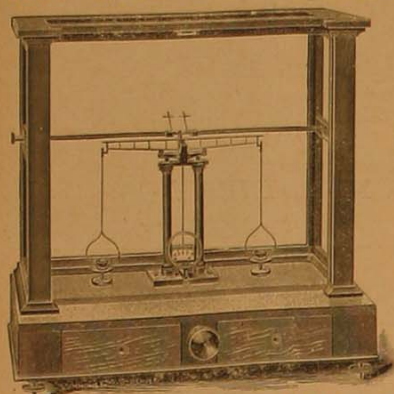
Jas. A. Burns, President

INCORPORATED MINES PAYING DIVIDENDS.

	NAMES OF MINES	LOCATION	No. of Shares	Capital Stock	Par Value	Amount of Last Dividend	Date of Last Dividend	Total Amount Paid in Dividends	Kind of Minerals Produced
1	Aetna Cons.	California	100,000	\$ 500,000	\$ 5	\$ 10	Oct 1899	\$ 195,000	Q.
2	Alamo	Utah	125,000	125,000	1	02	April 1899	2,500	G, C, L.
3	Alaska, Treadwell	Alaska	200,000	5,000,000	25	37 1/2	Oct 1899	4,220,000	G.
4	Alaska Mexican	Alaska	200,000	1,000,000	5	10	Oct 1899	429,031	G.
5	Anaconda Copper	Montana	1,200,000	30,000,000	25	2 00	Nov 1899	12,150,000	C.
6	Anchorage Leland	Colorado	600,000	600,000	1	03	Oct 1899	234,000	G.
7	American Gold	Colorado	800,000	3,000,000	10	09	June 1899	434,000	G. S. L.
8	American Coal	Maryland	60,000	1,500,000	25	1 25	Sept 1899	727,500	Coal
9	American Zinc, Lead and Smelting	Missouri	200,000	500,000	25	10	Oct 1899	40,000	Z, L.
10	April Fool	Nevada	500,000	500,000	1	01	Oct 1899	16,000	
11	Aurora	Michigan	100,000	2,500,000	25	50	June 1899	890,000	L.
12	Argonaut	California	200,000	2,000,000	10	10	Nov 1899	400,000	
13	Bald Butte	Montana	250,000	250,000	1	08	Dec 1899	762,141	G, C, S.
14	Bonanza Development	New Mexico	300,000	3,000,000	10	3 50	June 1899	1,500,000	
15	Boston & California	California	600,000	600,000	1	06	June 1899	72,000	
16	Boston and Colorado Smelting	Colorado	15,000	750,000	50	75	Oct 1899	375,000	
17	Boston & Montana Con.	Montana	150,000	3,750,000	25	1 00	Nov 1899	14,500,000	G, C, S.
18	Breece	Colorado	200,000	5,000,000	25	05	Dec 1899	70,000	I.
19	Bullion Beck and Champion	Utah	100,000	1,000,000	10	10	Dec 1899	2,438,400	G, S.
20	Bunker Hill and Sullivan	Idaho	300,000	3,000,000	10	07	Dec 1899	768,000	S, L.
21	Cariboo-McKinney	British Col.	800,000	800,000	1	01 1/2	June 1899	311,965	G.
22	Calumet & Hecla	Michigan	10,000	2,500,000	25	20 00	Sept 1899	64,850,000	C.
23	Centennial Eureka	Utah	30,000	1,500,000	50	50	Aug 1899	2,150,000	S, L.
24	Central Lead	Missouri	10,000	1,000,000	100	50	Dec 1899	142,000	L.
25	Charleston	S. Carolina	10,000	1,000,000	100	2 00	June 1899	200,000	
26	Colorado Smelting	Montana	100,000	1,000,000	10	1 00	Jan 1899	1,945,000	G. S. C.
27	Commonwealth pref.	Missouri	100,000	500,000	5	01	Dec 1899	20,000	Z.
28	Delta Lead & Zinc	Missouri	100,000	100,000	1	00 1/4	Dec 1899	4,100	
29	De Lamar	Idaho	40,000	2,000,000	5	12	May 1899	2,346,000	G, S.
30	Deer Trail No. 2	Washington	1,000,000	1,000,000	1	00 1/4	Nov 1899	45,000	
31	Doe Run	Missouri	5,000	500,000	100	50	Dec 1899	90,000	L.
32	Empire State Idaho	Idaho	75,000	750,000	10	30	Dec 1899	323,037	
33	Fanny Rawlings	Colorado	1,000,000	1,000,000	1	01	Aug 1899	20,000	G, S.
34	Ferris-Haggerty	Wyoming	1,000,000	1,000,000	1	00 1/2	Mar 1899	5,000	C, G, S.
35	Garfield Consolidated	Colorado	1,200,000	1,200,000	1	01	May 1899	34,000	G.
36	Golden Star	Ontario, Canada	100,000	100,000	1	01	July 1899	41,000	
37	Gold Coin of Victor	Colorado	1,000,000	1,000,000	1	01	Nov 1899	260,000	G.
38	Gold King	Colorado	1,000,000	1,000,000	1	03	Oct 1899	90,000	G.
39	Golden Cycle	Colorado	200,000	1,000,000	5	05	Dec 1899	258,500	
40	Grafton	Colorado	1,000,000	1,000,000	1	01	Nov 1899	10,000	G.
41	Grand Central	Utah	250,000	250,000	1	24	Sept 1899	666,250	G, S, C, L.
42	Gwin	California	20,000	1,000,000	50	25	Dec 1899	101,500	G.
43	Grass Valley Exploration	California	50,000	100,000	2	25	Oct 1899	30,000	
44	Helena and Frisco	Idaho	500,000	2,500,000	5	25	Nov 1899	920,000	S, L.
45	Highland	S. Dakota	100,000	10,000,000	100	20	July 1899	3,924,718	G.
46	Holy Terror	S. Dakota	300,000	300,000	1	01	Nov 1899	162,000	G.
47	Homestake	S. Dakota	125,000	12,500,000	100	50	Nov 1899	8,038,750	G.
48	Horn Silver	Utah	400,000	10,000,000	25	05	July 1899	5,270,000	S, L.
49	Idaho	British Columbia	500,000	500,000	1	05 1/2	Jan 1899	292,000	
50	Isabella	Colorado	2,250,000	2,250,000	1	01	Sept 1899	472,500	G.
51	Jack Pot	Colorado	1,000,000	1,000,000	1	04	Sept 1899	75,000	G.
52	Jamison	California	390,000	3,900,000	10	10	Apr 1 1899	50,700	
53	Klondike Bonanza, Ltd	Klondike	52,750	263,750	5	24	Aug 1899	12,680	
54	Lake Superior Iron	Michigan	84,000	2,100,000	5	25	Feb 1899	736,000	L.
55	Lillie	Colorado	1,000,000	1,000,000	1	05	Nov 1899	301,610	G.
56	Modoc	Colorado	500,000	500,000	1	01	Nov 1899	170,000	G.
57	Montana Ltd	Montana	660,000	3,300,000	5	12	Apr 1899	2,997,557	G, S.
58	Montana Ore Purchasing	Montana	40,000	1,000,000	25	1 00	Oct 1899	1,380,000	
59	Morning Star	California	2,400	240,000	100	3 00	Oct 1899	751,800	G.
60	Mercer	Utah	200,000	5,000,000	25	25	Oct 1899	1,341,000	G.
61	Mammoth	Utah	400,000	10,000,000	25	10	Nov 1899	1,610,000	G, S, C, L.
62	Mead	California	2,000,000	2,000,000	1	20	June 1899	120,000	G.
63	Moulton	Montana	400,000	2,000,000	5	05	Oct 1899	500,000	
64	Mt. Shasta	California	20,000	100,000	5	30	May 1899	6,000	
65	New York & Hon. Rosario	Central A.	150,000	1,500,000	10	10	Nov 1899	1,130,000	S, G.
66	New York Zinc	Missouri	28,000	700,000	25	25	Dec 1899	21,000	
67	Napa Cons.	California	100,000	700,000	7	30	Oct 1899	1,040,000	Q.
68	New Idria Quicksilver	California	100,000	500,000	5	30	Oct 1899	170,000	Q.
69	North Star, Mines of N. J.	California	200,000	2,000,000	10	20	Nov 1899	50,000	G.
70	Original Empire	California	50,000	5,000,000	100	3 00	May 1899	500,000	G.
71	Oscoda	Michigan	50,000	1,250,000	25	1 50	Dec 1899	3,080,500	C.
72	Parrot	Montana	230,000	2,300,000	10	1 50	Oct 1899	3,035,888	C.
73	Pennsylvania Consolidated	California	51,500	5,150,000	10	20	Dec 1899	136,475	
74	Pioneer	California	100,000	1,000,000	10	12 1/2	Mar 1899	62,500	G.
75	Portland	Colorado	3,000,000	3,000,000	1	02	Nov 1899	2,437,080	G, S.
76	Quicksilver Pref.	California	43,000	4,300,000	100	50	May 1899	1,845,411	Q.
77	Quicksilver Consolidated	California	57,000	5,700,000	100	40	July 1899	643,867	Q.
78	Quincy	Michigan	100,000	2,500,000	25	6 00	August 1899	11,070,000	C.
79	*Republic Consolidated	Washington	3,000,000	3,000,000	1	01	Sept 1899	323,000	G.
80	Rambler-Cariboo	British Col.	1,000,000	1,000,000	1	01	Dec 1899	60,000	S, L.
81	Royal Consolidated	British Col.	2,500,000	2,500,000	1	01	June 1899	1,050,000	G.
82	Sacramento	Utah	1,000,000	5,000,000	5	00 1/2	Oct 1899	133,000	G.
83	Small Hopes Consolidated	Colorado	250,000	5,000,000	20	10	Feb 1899	3,325,000	S.
84	South Swansea	Utah	150,000	150,000	1	05	Dec 1899	165,000	S, L.
85	Standard	Idaho	500,000	500,000	1	08	Apr 1899	1,745,000	G, S.
86	Standard Consolidated	California	200,000	20,000,000	100	10	Aug 1899	3,879,226	G, S.
87	St. Joseph	Missouri	30,000	3,000,000	10	50	June 1899	2,859,500	L.
88	Silver King	Utah	150,000	8,000,000	20	34	Dec 1899	2,400,000	S, L, G.
89	Smuggler	Colorado	1,000,000	1,000,000	1	01	Dec 1899	1,220,000	S, L, Z.
90	Swansea	Utah	100,000	500,000	5	05	Nov 1899	251,000	S, L.
91	Tamarack	Michigan	60,000	1,500,000	15	6 00	Dec 1899	6,270,000	C.
92	Tomboy	Colorado	200,000	2,000,000	10	24	Dec 1899	812,000	G.
93	Vindicator Consolidated	Colorado	1,500,000	1,500,000	1	05	Oct 1899	304,500	G.
94	War Eagle Consolidated	British Col.	2,000,000	1,000,000	1	01 1/2	Dec 1899	492,750	
95	Wolverine	Michigan	60,000	2,500,000	1	1 50	Oct 1899	270,000	C.
96	Yellow Aster	California	100,000	1,000,000	25	10	Dec 1899	283,789	G.

S. Silver; G. Gold; L. Lead; C. Copper; Q. Quicksilver; I. Iron Z. Zinc.

N. B.—Companies not listed paid nothing in the last twelve moths. *Paid since consolidation, \$203,000; Republic paid \$120,000 under old management

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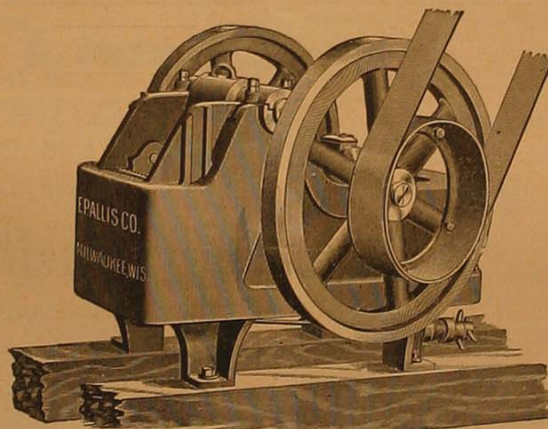
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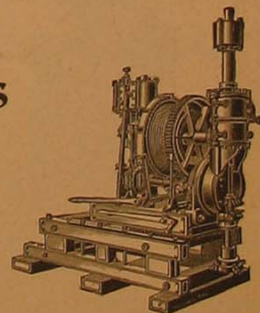
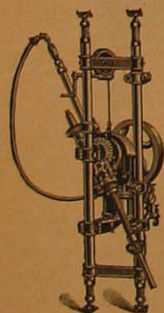
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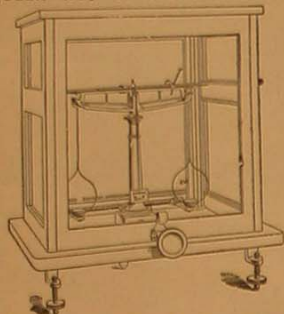
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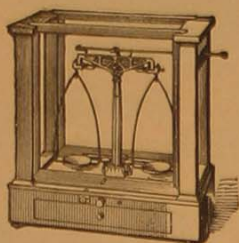
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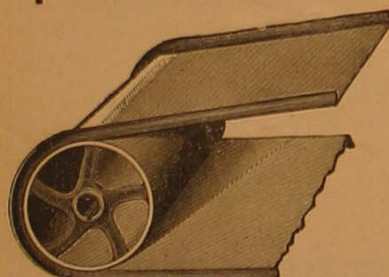
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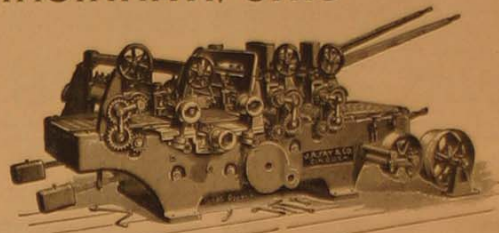
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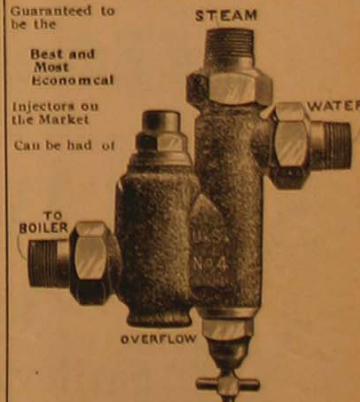
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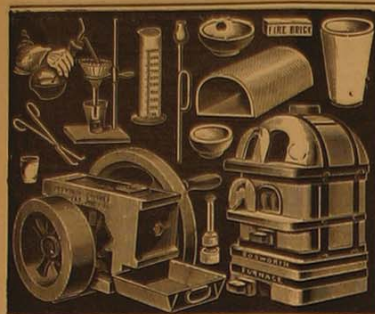
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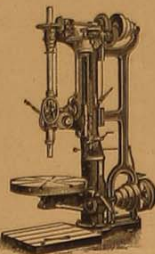
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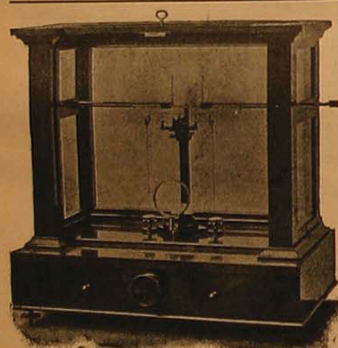
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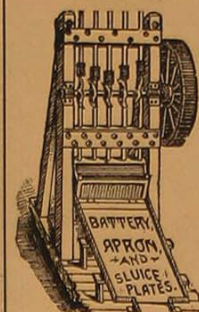


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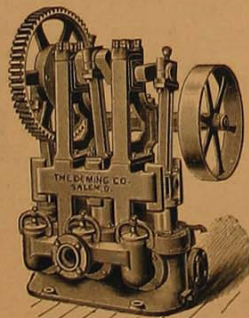
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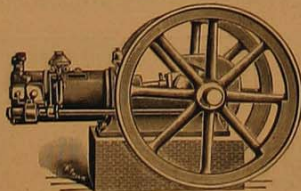
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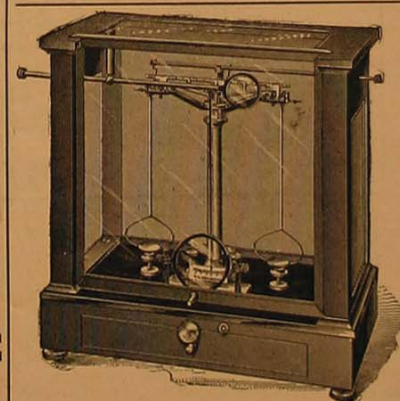
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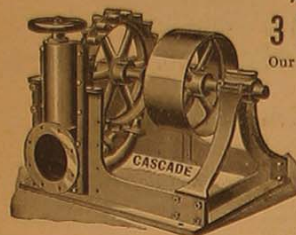
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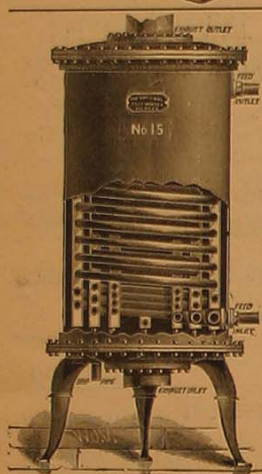
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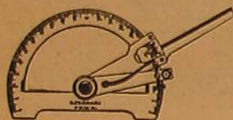
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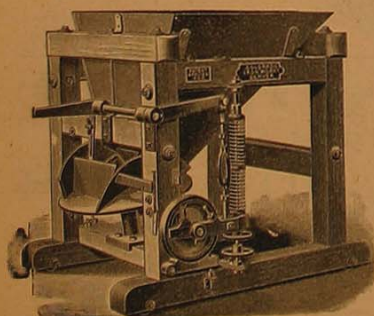
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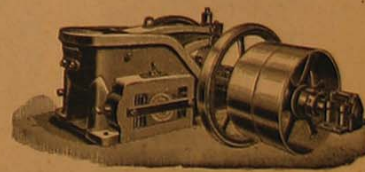
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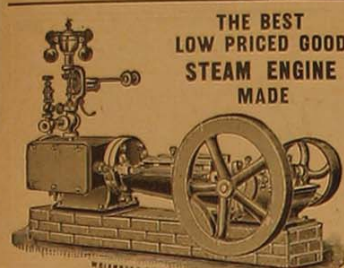
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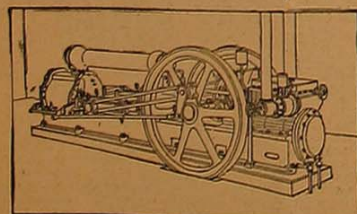
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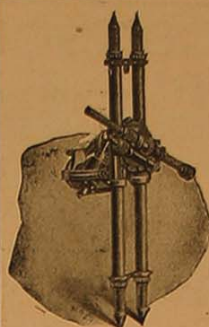


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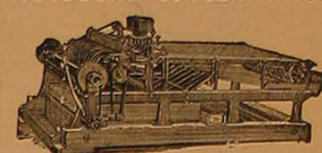
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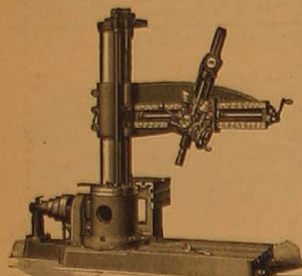
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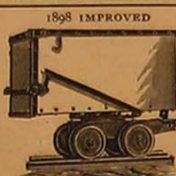
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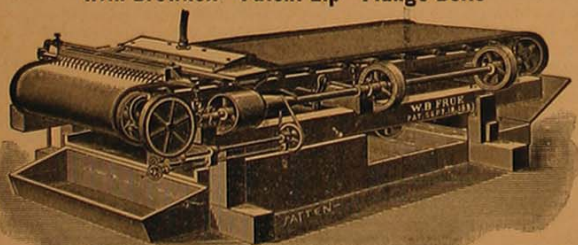
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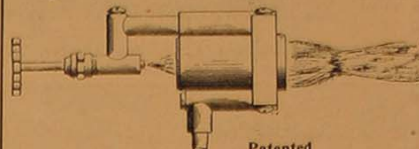
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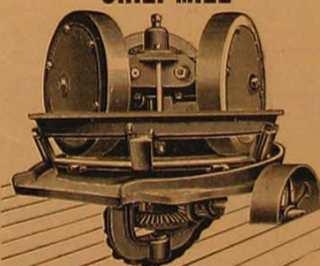
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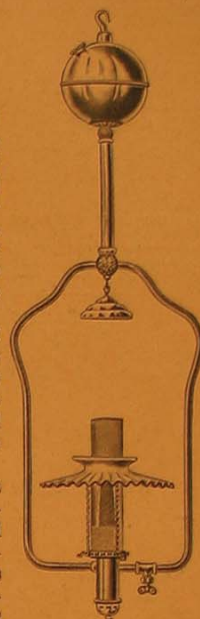
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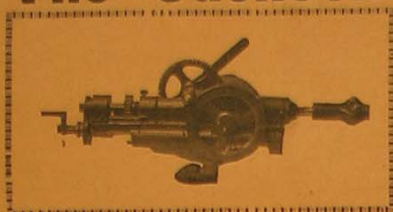
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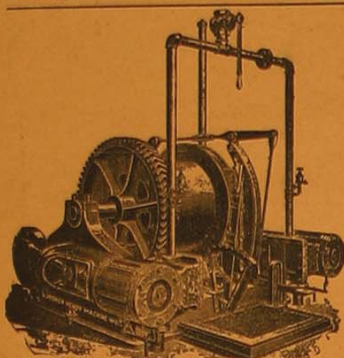
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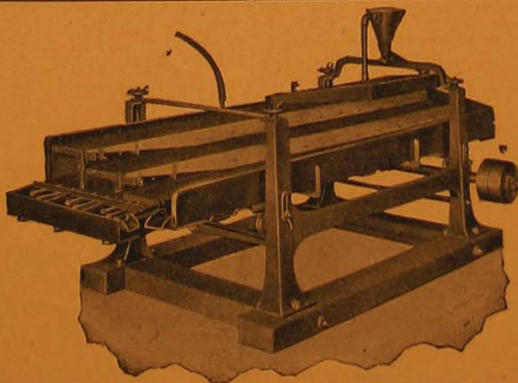
THE BARTLETT CONCENTRATING TABLE

One of these Machines will take the place of TWO or THREE Belt Concentrators of any make and do as good work. Separates ALL the minerals from each other at one operation. Gives THREE CONCENTRATES on the one Machine at the same operation. The Machine is especially adapted to the separation of Zinc and Lead.

Price, 12-ft. Table, \$350

Shipping Weight 2200 Pounds
Capacity, 10 to 30 tons per 24 hours

Licenses for the
Manufacture and Sale



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Parties desiring tests made can send 500 lbs. or more, charges prepaid, and a run will be made and reports forwarded of the results free of all charges, except for the assay, which will not exceed \$10.00.

CAN BE SET UP ANYWHERE.
Requires No Special Foundation

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